JOURNAL

OF THE

FRANKLIN INSTITUTE

OF THE

State of Pennsylvania,

DEVOTED TO THE

MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

AND THE RECORDING OF

AMERICAN AND OTHER PATENTED INVENTIONS.

AUGUST, 1833.

Remarks on Colonel Long's Locomotive Engine.

We have been gratified at meeting with the following notices in two of the Philadelphia papers, and in the absence of more particular information respecting this locomotive engine, we have thought them worthy of publication in the Journal. We have noticed this engine in our list of patents in the present number, p. 22. This notice was written five months ago, and the distance of the Editor from Philadelphia, has prevented all personal examination of the engine; he is informed, however, that the inventor has found it necessary to increase the heating surface of his boiler; should this information prove to be correct, the Editor may take to himself some credit for having anticipated the necessity of this change. Should this not have been found necessary, so much the better, as the inventor will have been saved the trouble and expense of so doing, and the Editor will be more pleased than mortified at being, in the present instance, a false prophet. We know of no one who is more deserving of success than Colonel Long, both from the qualities of his mind, and the perseverance with which he has devoted both it and his purse to the accomplishment of his purpose.

EDITOR.

Locomotive Engine.

Philadelphia, June 7.

The locomotive engine, called the Pennsylvania, invented and patented by Colonel S. H. Long, of the United States Army, has been fairly tried and approved on the Germantown rail-road.

Recent experiments have shown that the engine is fit to draw thirty-two tons, easily, on a level road, at the speed of fifteen miles an hour.

The whole weight of the engine is four tons and a half, the boilers evaporate two hundred gallons in an hour, in which time they require the consumption of something less than two bushels of anthracite coal, the only fuel used.

The wheels are made of wood, each with an iron tire of three parallel, concentric, circular bands, cheap in price, but very substantial, strong, lasting, and efficient.

Colonel Long has employed himself, for some time past, on experiments for the application of the heat produced by anthracite coal to the production of steam for locomotive engines, and has succeeded in a degree above the most sanguine expectations with which he started. With his arrangement of the furnace and the flue, anthracite may be used for raising steam, more advantageously than the best pine wood. It sends forth no sparks to burn or alarm passengers careful of their dresses; and emits no disagreeable or pernicious vapour; and it enables the director to travel without the encumbrance of a tender, as the fuel and the water are both carried on the engine. [*Daily Chron.*

Locomotive Engine.

Colonel Long's engine is now in successful operation on the Philadelphia, Germantown, and Norristown rail-road. Colonel Long deserves great credit for the genius, patience, and unremitting perseverance which he has displayed in bringing into operation this beautiful machine. Its principal merits consist in its light weight, and the consumption, as fuel, of *our anthracite coal.* The engine weighs four tons and three-quarters with her fuel and water, carrying no tender, as her water tanks are on the top of the machine. Col. Long has been for a considerable time experimenting on the subject of the use of anthracite coal for fuel, and has met with repeated failures and disappointments.

This enterprising gentleman, however, not discouraged by these circumstances, persevered, and has at last realized the complete success of this valuable improvement, which not only obviates the emission of sparks and smoke, but establishes a most economical, and, therefore, highly valuable, improvement. We advise our citizens to examine it. The company deserve credit for the facilities which they have afforded for the development of the invention.

[*U. S. Gaz.*

Arrangement for stopping sparks from the flues of locomotive engines in which wood is used as fuel. By J. M'Ilvaine.

TO THE COMMITTEE ON PUBLICATIONS.

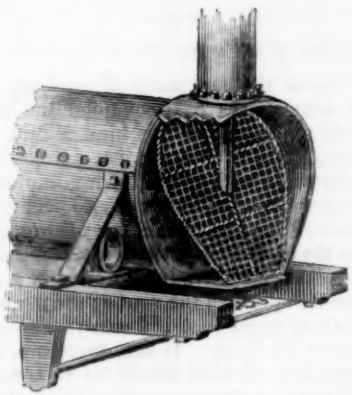
Gentlemen,—I respectfully submit for publication the following observations upon a subject which is of some importance to proprietors of locomotive engines in this country.

A failure of the preceding efforts at arresting the sparks from the chimnies of locomotives in which wood is used as fuel, may be thus estimated or explained.

A boiler containing ninety-six tubes, each one inch and a half in area will afford a space for the passage of vapour equal to one foot square. A chimney twelve inches in diameter, has an area of rather more than three-fourths of a square foot, consequently the vapour, without taking into account the space required for the escape steam, must move through the chimney with an increased velocity, which, if checked, will seriously impede the draught. Thus it is easy to see that it is improper to place a wire net at the base of the chimney; this contracts an opening already small, and which cannot, with propriety, be much enlarged beyond the dimension supposed.

A still stronger objection may be urged against placing a wire basket on the top of the chimney. The velocity with which the vapour and escape steam are driven out, cause them to impinge, with considerable force, against the wires, whence their particles rebound and so obstruct each other, and should a spark be retained, it will but increase the previous evil. Again, the openings between the wires are, necessarily, so placed, that but few of them present a free passage for the smoke.

These objections will, I flatter myself, be effectually obviated, by placing a screen of wire in the smoke chamber, as seen in the accompanying figure; the diagonal position allows a net of ten times the area of the flues, while almost all the vapour will come in contact with it nearly at right angles; if we allow one-half for retardation, we still require but one-fifth the velocity of the draught through the flues, and one-sixth of that in the chimney, a retardation which seems to be amply sufficient to allow the burning coals to fall; if, however, these are retained on the wires, not having the steam and condensed water thrown upon them, they will be consumed.



It seems probable that most of the sparks which escape, are those

which have passed through the upper flues, and striking the front plate have rebounded, and are caught by the vapour while it is gathering into the foot of the chimney, which it must do with considerable velocity.

If this supposition be correct, the net placed at the base of the chimney would retain the sparks to the obvious injury of the draught, as the velocity of the current will hold them against the net until consumed, that being the most contracted part of the chimney owing to the fact that the escape pipe rises above this place. To put the network above the steam pipe, would be worse than to use the basket on the top of the chimney.

Respectfully yours,
J. M'ILVAINE,
No. 19, *St. James Street, Philadelphia.*

Description of a Percussion Lock for Cannon, adopted from the French service, by BENJAMIN HUGER, *Captain of U. S. Ordnance Corps.*

(Communicated by Prof. A. D. BACHE.)

GENTLEMEN,—I offer to you for publication a description of a percussion gun lock for cannon, received from my friend Capt. Huger, of the Ordnance. This lock has been tested in the French service, and since its introduction into our own by Capt. Huger, has been the subject of experiment at Old Point Comfort: the experiments, I am assured, have proved satisfactorily that the lock will answer perfectly the purpose for which it was intended.

Very respectfully, yours,
A. D. BACHE.

Description of a Percussion Lock for Cannon.

The determination of the best mode of applying percussion locks to cannon, has for some years past occupied the attention of many persons. The great advantage of this kind of lock for cannon may be rendered evident, without entering into details, by a statement of the facts that it dispenses with the following implements, which are now attached to all guns, viz. the lintstock and port-firestock, the slow-match and port-fire, and renders unnecessary the operation of pricking and priming, while the certainty, accuracy, and rapidity of the fire are increased. From the necessary size of the vent of a cannon, the blast which is forced upwards through the vent at the moment of the explosion of the charge, is so great that it destroys any lock that remains within the influence of its force. It has, therefore, been found absolutely indispensable that the lock should be so constructed, that the hammer, after striking and exploding the primer, shall be immediately removed beyond the reach of the blast from the vent. Lieut. Ring-

gold, in 1831, presented a lock constructed upon this principle. The hammer had a double movement, and after striking and exploding the primer, was acted upon by a lateral spring and moved without the reach of the blast. This lock was submitted to experiment at Fort Monroe, under the superintendence of a Board of officers. It stood the test of the experiment, and the only objection that could be made to it was its great cost, and the extreme nicety required in its construction. In July, 1832, the French frigate La Flore came into Hampden Roads, and the captain, while on a visit to this Fort, stated, in conversation, that he had percussion locks to his guns. I shortly after went on board the frigate, and was politely allowed by Capt. Le Blanc to take a sketch of his lock, from which I had others made. I mentioned to you in a former letter that I had this lock, and I should have sent you a description of it before, but I wished to test it fully, and to be thoroughly convinced that it answered all the purposes required, before I laid it before you. Capt. Le Blanc informed me that it had been adopted by the French government, that all the ships were provided with them, and that all the batteries at Brest were armed with them. He could not inform me if they were used in all their garrisons, as Brest was the only one which he had visited since their adoption. The locks were stamped with the name of Potter, the inventor. I have made several of these locks and adapted them to guns with or without raised vent fields, and of all calibres, and have found them to succeed perfectly in all cases; the fire is certain, and the locks remain uninjured by use, or by the action of the blast from the vent. The drawing I now send you is the copy of one used on a 42 pound gun, with a raised vent-field.

The idea which gave rise to the construction of this lock, was that of placing it crosswise on the gun. In all others the lock is made to lay parallel to the length of the gun; this lock, on the contrary, is placed at right angles to the axis of the gun, and a plane passing through the centre of the casting, shown by fig. 2, would pass through the centre of the exterior orifice of the vent, and cut a circle out of the gun.

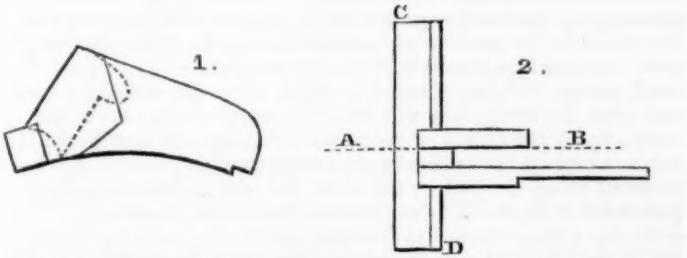
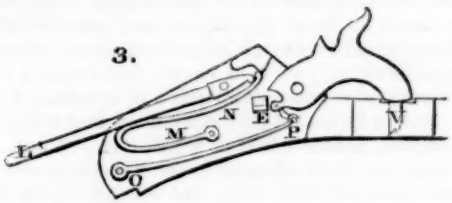
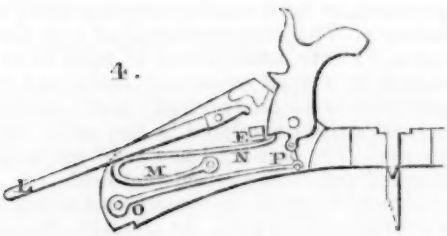


Fig. 1* shows the elevation of the left side of the casting of brass on which the hammer and springs are placed.

* The cuts are on one-fourth the scale of the original drawings.—COM. PUB.

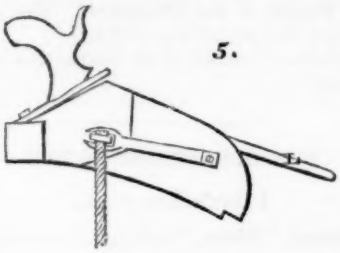
Fig. 2, is a horizontal projection of the casting. The hammer works between the two sides of the castings, and the springs are attached to the interior of the left side. The lock is attached to the gun with a raised vent-field, by two screws, fig. 9, which pass through the front of the casting C D, and the vent-field, and are clamped by a nut on the opposite side. To guns without raised vent-fields, it is attached by two short stout screws passing vertically through the castings, C D, and into the metal of the gun.



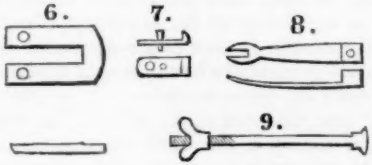


Figs. 3 and 4, are exterior views of the lock, supposed to be sections on the line A B of the casting. Suppose the lock to be attached crosswise on the gun, (see figs. 3 and 4.) The main spring M N, in its natural position, is represented in fig. 3. The small spring O P, in its natural position, is represented in fig. 4; by the action of the small spring on the stirrup attached to the end of the hammer, this latter stands in the position represented in fig. 4. To cock the lock, push the hammer down on the vent, overcoming the action of the small spring, O P, fig. 3, which is slight, sieze the end of the lever L and raise the lever; this will force the main-spring down over the catch, fig. 7, the end of which projects through the mortice E. This catch is kept in its position by the outside spring shown in fig. 5, and in detail in fig. 8. Let go the lever, the lock is then cocked, as represented in fig. 4. To fire, place a percussion primer on the vent, sieze the string attached to the other end of the catch represented in fig. 5, pull it, and this withdraws the catch from over the main-spring which immediately flies up to assume its natural position, driving the hammer down upon the vent with great force, and exploding the primer. Its length is so adjusted that as soon as the ham-

mer strikes the vent, the main-spring clears the end of it, and the



action of the small spring causes the hammer instantaneously to resume the position in which it is represented in fig. 4, and the blast from the vent passes entirely clear of it. Fig. 6 represents a plate of steel which is attached to the front of the casting by two screws; it serves to receive the jar of the hammer when it is jerked back to its position by the action of the small spring O P.



The drawing shows by what a simple contrivance the hammer is made to escape the blast of the vent, and a slight inspection of it will show how perfectly simple all the parts are, and consequently how easily and cheaply they may be constructed. From comparing this lock with the common musket lock, I am of opinion that two of these locks could be constructed for the same cost as one musket lock. The lock is not liable to get out of repair, and should any part be damaged it could be easily replaced.

BENJAMIN HUGER,
Capt. U. S. Ordnance.

FRANKLIN INSTITUTE.

Fourth Monthly Meeting for Conversation on Mechanical Subjects.

Doctor Ebenezer Cooley explained a plan devised by him for supplying the city of New York with water: the plan is intended to save the expense which would be incurred in the erection of a large aqueduct.

It will be submitted to the committee on inventions for examination.

Prof. A. D. Bache exhibited the drawings of a French percussion lock for cannon, which has been introduced into the United States' service by Capt. Huger, of the Ordnance. The drawings and description are given in the preceding article.

Both subjects produced matter of an instructive kind in the way of discussion and remark.

BIBLIOGRAPHICAL NOTICE.

Flint's Lectures.

Lectures upon Natural History, Geology, Chemistry, the Application of Steam, and Interesting Discoveries in the Arts. By Timothy Flint.

Nothing is more dangerous to a just appreciation of one's powers, than for a man to find himself at the head of a party or coterie; and within certain bounds, the smaller the latter is, the greater the danger. An illustration of the truth of this remark is shown in the appearance of the work the title of which is at the head of this article. Mr. Flint had been known, and we believe favourably so, as the author of a work on the Valley of the Mississippi, and of another of which we saw a favourable review in a respectable British journal. But he unfortunately appears to have thought himself a *lion in the prairies*, and the result has been as above. A western *brother*, in an admirable article,* has observed upon some of the more remarkable points of the natural history of the work, such as the magnifying eyes of the horse, the hair turned into a water snake, the wonderful fact of a dog's eyes being useless to the owner thereof, &c. Our remarks will, therefore, be confined to some of the prominent points in the chemical and physical branches. In these the definitions and general classifications are usually excellent. Bodies through which the light passes freely are called transparent. Those which *retain* the light are named *opaque.* p. 25.

In this sense we presume it to be that metallic mirrors are opaque, they *reflect* all the light that falls upon them, and therefore, we presume, *absorb* it. So, likewise, the moon is opaque, retaining all the light that falls upon it from the sun, and giving no light to the earth.

"The mineral acids have known and simple bases; the vegetable acids have *double* bases; and the animal acids have *triple* bases. They are decomposed by combustible substances, *and with metals, form oxides.*"—p. 59.

We had supposed that oxides were compounds of bases with oxygen, but are glad to learn, and are particularly pleased with the lucid exposition of the nature of mineral, vegetable, and animal acids!

The happy illustration of what constitutes an acid is but little exceeded by the judicious selection of the alkalies with metallic bases, embraced in the following paragraph.

* Western Monthly Review.

"The alkalies are potash, soda, ammonia, and lithia, of which the three first are known to have metallic bases."—p. 59.

A few other examples will suffice to give fair specimens of Mr. Flint's facts and philosophy. Fact,—Acids "administered in a concentrated form, are strong poisons, for which the remedy is the application of *alkalies drunk in solution*," (p. 60,) and then we suppose the remedy for the alkali is a little more acid.

Philosophy,—

"The most important *mechanical* agent in chemical processes is sulphuric acid."—p. 60.

Philosophy,—

"There are two forms of affinity. The first is that which only takes place between bodies of the same nature, and is named the attraction of aggregation. *Two* drops of water, and a *cube* of gold are aggregations."—p. 58.

Heat, or, as our author loves to term it, caloric, is a very simple matter; but there is a mystery about it which is seemingly inexplicable.

"There is another universal law, apparently the exact reverse of affinity, which incessantly tends to separate those bodies which that principle holds together. The cause of it is a subtle element diffused through the universe, which is called caloric; *but by a seemingly inexplicable mystery, both principles appear to proceed from the same body, the sun.*"—p. 62.

The history of the Greek fire is unique, it has been hitherto supposed to be a subject admitting of some of the labour of the commentator.

"The Greek fire was discovered in the seventh century by Callinicus, a Greek engineer, and was lost from that time to the reign of Louis XV. of France. It was then discovered anew by Duprè. This terrible fire also has been prepared by Sir Humphrey Davy. Thenard composed it of charcoal, iron, and calcined potash. By the re-union of the iron and potash, a hydrate of potash is produced."—p. 79.

We can hardly italicise here, for it has been said that these catches to attention lose their effect when too frequently repeated.

Mr. Flint is a man who is not afraid of questioning; thus, "you will ask me, perhaps, why Providence has departed from its general economy to water Egypt in this remarkable way," (p. 120,) he is the only person who has ever ventured to dispute supremacy with the old lady who used to collect her dependants around her every evening, to determine for their benefit what weather they were to have the next day.

Philosophy and fact:—

"At this day" it appears that "the fair pupils of our female schools can explain the phenomenon, (viz. *why fuel made fire*,) that confounded Voltaire."

It appears that—

"To set wood or coal on fire is to cause it to absorb oxygen from the atmosphere, and to liberate the azote combined with it. You divine at once what becomes of the caloric which was combined with the oxygen of the air. In the same proportion as the oxygen appears in a sensible form there is a disengagement of light and heat. We see, then, that the heat of a body in combustion is

produced by the atmosphere which surrounds us, and not by the burning body itself."—p. 126.

If the explanation of combustion is satisfactory, those are even more so, which relate to the natural phenomena, earthquakes, water spouts, volcanoes, and meteoric stones, for they "seem to owe their origin to the different aerial elements in combination with carbonic acid."—p. 135.

But I ask no more space for such sheer folly; a point of much greater importance is the influence that the work might exercise on any class in which it might unfortunately obtain circulation. I mean the ramblings of the writer from one subject to another, guided by the merest accidental resemblances, or the most fanciful analogies; not excepting in these flights a subject the highest that can interest humanity, and which should be spared from the reveries of a christian minister at least. But seeing in Mr. Flint's case, as the writer believes he does, the operation of a general law founded on human weakness, to which all must in part yield, he is fain to believe him curable; but for this he must be left to himself; self-examination alone can show him whether he has been employing his talents in the way most profitable to the community; and whether he, with the influence which he possesses, or might possess, in the west, and with the consequent power of effecting so much good, is not *responsible* for abuse of time and talents. The writer therefore leaves him, with a promise to be the first to hail with pleasure any future effort of his which may counteract the possible bad effect of the present. W.

Elements of Geometry, with Notes, by J. R. Young, author of an Elementary Treatise on Algebra. Revised and corrected, with additions, by M. Floy, Jr., A. B. Philadelphia, Carey, Lea, & Blanchard.

The first eight books of these elements of geometry have lately issued fron the press of Messrs Carey, Lea, & Blanchard. They contain the geometry of lines. That of planes and solids is promised in part second.

The author has acquitted himself of the task before him in a masterly manner. None but the most rigorous methods of reasoning are employed. The author has omitted many of the theorems and lemmas of Euclid, which possessed no other value than that which arises from their forming a link in the chain of reasoning by which some geometrical truth of use in higher mathematics, is demonstrated. The promulgation and demonstration of useful geometrical truths have been his object, and wherever these could be arrived at by shorter methods than those of Euclid, either through his own invention, or by availing himself of the discoveries and inventions of recent geometers, it has been done in the most judicious manner. But this is not all, amidst the immense progress which science of every kind has made

in modern times, it is not to be expected that geometry has been stationary. The veneration for the great father of Geometry has checked, in England, the progress of free inquiry in this department. The labours of Simpson and of Playfair, have been restricted to annotations and modifications of single propositions. Mr. Young has taken a bolder course and has written an original treatise on the subject. Without disparaging the methods of Euclid he has only employed them when preferable to those of other writers.

In one particular, the discussion of the converse of propositions, he has outdone all his predecessors. His work more nearly resembles that of Legendre than any other we have seen. The first book is almost identical with Legendre. This is far from being a defect; it is no discredit to this book to bear so close a resemblance to that of "the first geometer in Europe." The fact that Mr. Young has been able to make improvements on M. Legendre's work, and in our opinion he has made them, speaks volumes in his favour. We have always been pleased with Legendre's Geometry—the beautiful simplicity which pervades it—the close connexion between the propositions—the immediate dependence of each on the one which precedes it—and the absence of all parade of useless theorems form its principal attractions. Some objections have been made to Legendre's work on the ground that it is not sufficiently rigorous. It is also said by Mr. Young to be defective in the theory of proportions; for ourselves we have never perceived this defect. The short but comprehensive enumeration made by Legendre of the changes, multiplications, evolutions, conversions, inversions, divisions, &c. that may be predicated of every proportion, has appeared to us sufficient. His applications of these abstract truths to geometrical proportion has to us seemed conclusive and sufficiently intelligible.

The other objection made to the work of M. Legendre, that of employing the method of superpositions, we conceive to be without sufficient foundation. We do not profess to understand the nice distinctions on which this objection is founded. We have never wished, for instance, for more convincing proof of the equality of two triangles, that have the two sides and included angle of the one, equal to the two sides and included angle of the other, each to each, than that which results from superpositions, by which it is shown that the two triangles coincide throughout and fill the same space. This seems to establish in the clearest manner their absolute identity. We have noticed these two objections to Legendre's work, because they are made the grounds of superiority claimed for Mr. Young's works. In our opinion its superiority must rest on other grounds. They are these, that while Mr. Young has retained all the excellencies for which Legendre's geometry was distinguished, he has added several improvements of his own, and with these has happily combined the most successful efforts of other modern geometers. Part second, on planes and solids will complete the elements of geometry; if these are executed with Mr. Young's usual skill, his work will form a valuable addition to the series already published in this country.

To say that the science of geometry was defective previously to the

publication of Mr. Young's work, would be to undervalue the labours of mathematicians of every age. To say that Mr. Young's is the only work in which all the theorems of linear geometry requisite for the study of the higher branches, are found, would be extravagant and unjust. Either of the editions of Euclid, Playfair's, or Simpson's, or Legendre's geometry, contains them all. If Mr. Young had written as good a work as M. Legendre's, it would have been enough, if he has surpassed Legendre, he has done more than could have been expected, and his work will be the more used for its intrinsic value, independent of that which it acquires from being the key to the best series of mathematical works ever published. X.

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN FEBRUARY, 1833.

With Remarks and Exemplifications, by the Editor.

1. For an improvement in the mode of *Measuring and Transferring Liquids;* Thomas W. Whitley, Paterson, Essex county, New Jersey, February 1.

A vessel is to be made in the form of a bucket, and to have an opening in the centre of the bottom of it, with a tube descending from it, converting it into a funnel, exactly like those used by brewers for filling barrels. The opening in the bottom is to be covered by a valve; a lever intended to open this valve may be acted upon by a rod leading up to the top of the bucket, on the inside; when the valve is opened, the liquid which may have been poured into the vessel will run out. There are divisions, or graduations, within the bucket, to indicate the quantity of liquor poured into it.

The object in view, we are informed, is to transfer liquids from one vessel to another without waste, and without the filth usually attendant on such business. There is no claim, and therefore the whole machine is to be considered as patented. It may be a very valuable affair, but to us it does not appear in this character.

---

2. For *Fence Posts;* Harry Vail, Cortlandville, Cortland county, New York, February 1.

This is no wooden contrivance, although it appertains to fence posts. Pieces to form the bottoms of posts, in those situations where they are liable to decay, are to be made of cast iron, and driven into the ground, to form the foundation of the post. The pieces of iron are to be somewhat in the form of the blade of a spade, with a shank projecting up to the height of about nine inches. This shank may be an inch and a quarter in diameter at its lower, and three-quarters of an inch at its upper end. A hole bored into the lower end of the post, receives this shank.

For gate posts the iron is to be larger, and the lower part is to be furnished with wings, something like those of winged gudgeons.

We apprehend that in loose soils it would be necessary to make the blade much longer than that of a spade, or the fence would soon be prostrated.

There is no drawing accompanying the patent, and although it can be understood well enough without one, still as "the nature of the case admits of drawings," the terms of the law are not complied with.

---

3. For a machine for *Cutting Sausage Meat;* Samuel L. Hoar, Salisbury, Lancaster county, Pennsylvania, February 1.

Four knives, standing out at right angles from a shaft, are to be made to revolve vertically by means of a band wheel. The meat to be cut is put into a hopper, or box, having an opening at one side, against which the blades of the knives rub, a facing of metal being placed around the opening. The meat, it is said, will require to be passed through about four times before it is sufficiently fine.

The knife blades are to be about six inches long.

---

4. For a *Mangle;* called the American Mangle, or Domestic Callender; Isaac Doolittle, Bennington, Bennington county, Vermont, February 1.

This mangle has four cylinders, two of which stand near to each other, and in the same horizontal plane, their axes resting on the frame of the mangle. A third cylinder rests on these two, its periphery touching them both; this cylinder is to be turned by a crank; it is covered with cloth, and sustained in such a way as to allow it always to be in contact with the lower cylinders, adapting itself to the varying thickness of the clothes to be mangled, which are to be wound round it. Above this last cylinder is a fourth, the gudgeons of which run in a movable frame, whereby it is allowed to rise and fall. This is called the pressing cylinder, and it is to be brought down upon the middle cylinder by means of a treadle attached to a lever, to which the foot can apply sufficient force. The crank is to be constantly turned in the same direction, the reciprocating movement of the common mangle being thus avoided.

The claim is to "the general arrangement," which seems to be simple and good.

---

5. For a *Reacting Water Wheel;* John Ambler, jr., Waterford, Saratoga county, New York, February 2.

This is a modification of the kind of reaction wheel for which several patents have of late been obtained. We do not see enough of novelty in it to make it necessary to give a particular description of it. If either of the patents previously taken, in which the general construction is claimed, are good, this cannot be so; if they are not good, there is nothing in this wheel to give it a decided, if any, superiority over them, so far, at least, as we can judge; this, however, may result from a want of clearness in the specification.

6. For a *Machine for Fleshing, Softening, and Working, Dry Hides;* Abner M'Millen, Bedford, Hillsborough county, New Hampshire, February 4.

This machine is to be substituted for the ordinary process of beaming; the hide to be beamed is to be carried between and around cylinders, by which the working of it is to be effected. It is first received between two fluted rollers, after passing which, it is to be acted upon by a cylinder that is made to revolve rapidly, and has on it four knives extending from end to end, and set spirally. The knives may be plain or scolloped, according to the nature of the work. The hide is drawn through by means of a cylinder around which it winds, this cylinder being furnished with a crank, to be turned by hand as the work proceeds. It is said that this machine will save one-half the labour usually required in beaming.

There is no claim made.

---

7. For an *Apparatus to cure Smoky Chimnies;* David Bain, city of Baltimore, February 5.

A tube of a suitable diameter is to be fixed on the top of the chimney, and to rise to a convenient height above it. A cap, somewhat larger than the tube is fixed at a sufficient distance from it to allow the smoke to escape. Another short tube is then fixed around that first named, rising above the cap, and extending below the opening. The cap is to prevent the blowing of wind down the chimney, whilst the smoke may escape either upwards or downwards. The claim is to the foregoing apparatus.

This contrivance is so much like many others which have preceded it, that we know not where its novelty lies; and in point of utility we apprehend that it will not be found better than its predecessors. The cure of smoky chimnies, like that of some other diseases, requires that the remedy should be adapted to the constitution of the patient. There is no universal panacea.

---

8. For a *Stationary Supply Water Tank;* William Kearney, and John M'Ardle, Brooklyn, King's county, New York, February 5.

This is an apparatus to pump water from wells, and to convey it for the supply of vessels at a wharf.

Two common lifting pumps are to descend into the well, the pistons of these pumps are attached to a horizontal beam, which is to be worked by a pendulum, a handle projecting from it for that purpose. Springs are shown in the drawing, which are to aid the pendulum, by pressing alternately on each end of the working beam. The water is to flow from the pumps into a large cistern, or tank, and from this cistern, or tank, a tube leads to the water side. A valve within the tank, closing the tube, is to be lifted by means of rods extending from the tank to the part where the supply is wanted, which rods have segments operating as bell cranks, and other mechanical appendages.

The claim is to "the before described method of conveying water to vessels."

Should we wish to convey water from a well to a vessel at some distance, we will take care to do so without interfering with "the before described method;" we shall, in particular, avoid the power of the pendulum, and of the springs, although we will certainly make a water tank if we like it. We will raise the water into it by two lifting pumps with a single beam; we will also convey the water from it along a tube, and at the end of this we will place an old fashioned cock, which we will open without a system of rods, segments, and levers, willingly leaving *them* to reward the patentees for their labours.

---

9. For a *Machine for Boring and Mortising Stiles for Doors, Window Blinds, &c.;* David Hathaway, Troy, Rensellaer county, New York, February 5.

A very elaborate description of this machine, or rather of these machines, is given, which concludes with the information that "all the improvements herein specified and described in the relative application and combination as above given to them, are considered by the undersigned as original in himself, and claimed by him as such." We consider, however, that the general arrangement of the mortising machine as here described, is no improvement upon some of those before patented, and that it is too much like them to be altogether original. The boring machine is unnecessarily complex, and is nowise better than many now in use; and as the patentee has not told us in what part of the apparatus he considers his improvements to reside, we shall not attempt any description of them, or of his machine generally.

---

10. For a *Suction Hose for Fire Engines;* James Riley, Boston, Massachusetts, February 6.

After describing the construction of the common suction hose, which is made in pieces of about seven feet in length, and kept distended by copper ferules placed near together, an arrangement allowing of but little elasticity, and requiring much trouble in screwing the parts together, the patentee goes on to describe his improved suction hose, which is thus made:—

A leather hose is formed in the usual way, and over this is wound wire of a suitable size, running spirally from end to end. The wire is to be stitched to the leather, and the whole then covered with a varnish, formed by dissolving gum elastic in spirits of wine: a second tube of leather drawn over this completes the hose. We are told that thus constructed it will be elastic, may be made of any required length, and wound round some part of the engine when not in use.

The objections to the old plan will, in this supposed new mode, be succeeded by others, at least equally formidable. The coiled wire will soon break; in bending the hose, the wires on one side recede from, and on the opposite side approach each other, and will not resume their proper positions; when bent out of shape, the cylindrical form cannot be restored, and to such bending they are constantly liable.

These and other objections caused such hose to be abandoned after a full trial seventeen or eighteen years ago, in the fire engine manufactory of Mr. Jacob Perkins, now Merrick & Agnew's, Philadelphia. How many other abortions this scheme may have undergone we know not, that which we have noticed was, probably, not the first, and it is likely that the present will not be the last.

Notwithstanding the utter absence of novelty in the general plan, there is something entirely original in the varnish made by dissolving gum elastic in alcohol; if the patentee has a good recipe for doing this, we hereby bespeak a right to it, either for love or money.

---

11. For an improvement in *Pumps*, intended to prevent the introduction of foreign substances into them; Frederick Kreig, Baltimore, Maryland, February 7.

We formerly noticed two patents for a similar object, which were obtained by a person of the name of Mettee, residing in Baltimore. The present is a very similar contrivance, intended to accomplish the same end by means nearly identical. The pump handle, where it passes through the pump tree, has a circular enlargement, working upon a pin in the usual way, and rendering a long slot unnecessary. The opening in the spout is made tortuous, to prevent the introduction of extraneous substances through that channel, and the cap is fastened down by a screw bolt. The things claimed consist of eight particulars, neither of which will give the slightest security to the patentee, as they are merely precise modes of making bolts, fixing parts together, &c., either of which could be just as well done in other ways.

---

12. For a mode of *Framing, kneeing, and securing a Ship's or other Vessel's Deck;* John Bearce, Bristol, Lincoln county, Maine, February 7.

The mode of framing, and securing together the timbers of a vessel's deck adopted by the patentee, he denominates a *lock, dovetail, key purchase.* Beams extend across from side to side of the ship in the usual way, but instead of securing them to the sides by knees, *lock chocks* are employed for that purpose; these lock chocks are notched, by dovetail notches, into the beams, in the manner in which trussed girders are sometimes notched; or rather in the manner of joining timbers to bear a longitudinal strain. *Filling-in chocks,* in one or two thicknesses, are fastened to the vessel's side, between the beams, and are made with a shoulder to fay to the *lock chocks.* Keys are driven in, wedgingly, between *the lock chocks* and *filling-in chocks,* to make all firm. The bows are also strengthened by a breast hook, made up of timbers united in the manner of the *lock, dovetail,* purchase, and bolted together.

The foregoing description will furnish, to those acquainted with the subject, a general idea of the mode of procedure; and the drawing deposited in the patent office does no more; there, however, is a framed model which shows the plan perfectly, but this is not capable of being published in a book.

13. For a *Shifting Cooking Stove;* Henry Cressman, city of Philadelphia, February 7.
(See specification.)

---

14. For a *Fireplace* for burning Anthracite Coal; William M. Russel, Boston, Massachusetts, February 8.

There are about this grate some things which are old and some which are new, but the patentee has not distinguished them from each other. The old parts consist in hollow jambs for heated air, air holes below the fire admitting air from without, and some other minor affairs. The construction of the grate, and the manner of hanging it, however, are, we believe, novelties. The ends of the grate are solid plates of cast iron, placed parallel to each other. There are bars both at the front and back, made precisely alike, as either may become the front. There are two movable bottoms, which are to be used alternately, in a way to be presently described. On the centre of each of the end plates, at the outside, there is a friction wheel, or roller, which also acts as a gudgeon, and on the jambs of the fireplace there are ledges upon which these rollers rest, and upon which they turn, allowing the grate to be drawn forward when required.

When the fire has been completely lighted, a register is opened which admits heated air to pass from the fireplace into another room. If there is any thing new in the mode of doing this, it is too obscurely described to make it known, and the drawing gives no representation of it, nor do we find any written references to the parts which are represented.

When the fire has gone out, or nearly so, fresh coal may be put into the grate, and charcoal upon it; the spare bottom is then to be placed and attached at top, the grate drawn forward and turned over, when what was the bottom is to be removed. The object of this is to prevent the necessity of raking out the coals to make a new fire. We think that one complaint is thus removed by introducing another which is equally, if not more, troublesome; the pulling out, and turning over, of the grate; the supplying a new bottom, and the getting rid of the old one, are each of them circumstances attended with trouble and inconvenience; all spare parts render such an affair objectionable in domestic economy, as they are not disposed of so easily as spare dollars, or kept in order with the certainty of fixtures.

---

15. For an improvement in *Dogs for Saw Mills;* Martin Rich, Ithaca, Tompkins county, New York, February 8.

There are two half bales, with teeth to hold the log, in the usual form; there are two eyes, one on the end of the straight, and the other of the curved part of each half bale; these eyes are tapped and fitted to a screw bolt, one to each half bale, running longitudinally with the head block; when these screws are turned they serve to move and gauge the log, and in this the improvement consists.

16. For an improvement in the *Wash-board;* Stephen Rest, Manlius, Onondaga county, New York, February 9.

This wash-board is in the ordinary form of the fluted wash-boards, but the flutes are to be formed of tin, copper, sheet iron, or zinc, and the claim is to the use of these. We have never believed that a mere change of material, whilst the form of a machine remained essentially the same, could present a valid claim to a patent; if it can, some one may obtain another for using sheet brass, prince's metal, pewter, or other alloys, some of which are quite as cheap, and quite as good for the purpose, as copper.

---

17. For a *Carriage Axle Tree;* Alexander Johnston, Essex county, New Jersey, February 9.

As we have already observed respecting another patent, so we say of this, the old and the new are blended together, the whole arrangement of the apparatus being given without sufficiently, if at all, distinguishing the parts improved. The end to be accomplished by this contrivance is the fixing a chamber for holding oil in such a way that it shall be supported by the axle, and not revolve with the wheel; and the conducting the oil from this chamber to the centre of the bearing of the axle. The cap of the wheel forms the oil chamber, and a hole is drilled in from the centre of the end of the axle, leading in a sloping direction to the side of it, near the middle of the bearing.

---

18. For a *Regulator for Water Wheels,* Wind Mills, Steam Engines, &c.; Nathan Scholfield, Montville, New London county, Connecticut, February 11.

This is an ingenious, and, we think, a very good mode of dispensing with the ordinary *governor,* which consists of two balls attached to levers, that recede from each other by the centrifugal force with which they are whirled round, and operate upon a throttle valve, or mill gate, to regulate the supply of steam, or of water. Instead of these two balls, the present patentee employs a pendulum, in such a way as to obviate one considerable inconvenience resulting from the use of the balls. We would gladly give the specification of this invention at full length, but have not the drawings, which must be referred to in order to its being understood; we, however, will furnish such extracts from it as will serve to show the principle upon which the operation depends, although not the exact mode in which it is applied.

"The regulation by this instrument depends upon the action of a pendulum put in motion by a cam, whose revolutions continually carry it forward from its perpendicular or natural position, in one direction, and then leave it at liberty to fall back, causing it to perform continual vibrations. From the nature of the pendulum it is evident that gravity will cause it to descend or move, through similar parts of its oscillations in equal times at each succeeding vibration; therefore if the motion of the wheel is uniform, the vibrations of the pendulum will be uniform also, but if the motion of the wheel is slower, it will suffer the pendulum to traverse farther, but if the motion is quicker,

the pendulum will be checked sooner by the cam, consequently before it will have described so great an arc. The motion of the pendulum, therefore, indicates, or tests, the velocity of the wheel, or engine, during each vibration."

The construction of the "test latches," and other parts, through the medium of which the vibrations of the pendulum operate as a regulator, are fully described, and exhibited by drawings, and the circumstance upon which the superiority of this instrument is principally dependent, is thus noticed:—

"Theory and experience concur in teaching us that some wheels, such as large overshot, and breast wheels, and the like, and those operating a large quantity of machinery, require a considerable time to be affected by an addition or a diminution of water, in consequence of the time required for filling, or emptying them, and the inertia to be overcome, which, in some cases, is very great; so that regulators on the principle of flying balls, or those which are constantly acting while the motion is not right, will generally have carried the gate too high or too low, by the time the wheel will have attained its proper motion."

"The principal advantages possessed by this regulator over those in common use, operating on the principle of the flying balls, are, the moving the gate to a water wheel, or turning the valve of a steam engine, suddenly, any given quantity, and then waiting any required time for the effect, whereby they may be moved farther in any given time, without the danger of carrying them too far, as is the case with the other kind which moves the gate gradually until the motion is right, thereby requiring a much longer time, and generally carrying it too far."

"The pendulum regulator requires much less room than the other kind, and dispenses with a considerable gearing, and expense in attaching it to a gate, requiring nothing but a rack, and a pinion, and a cog wheel on one shaft."

"What I claim as my invention is the application of the pendulum on the principle herein described, and the arrangement and application of the different parts of the machine as a regulator for water wheels, steam engines, &c."

---

19. For an improvement in the *Spindle, Flyer, and Bobbin, for Spinning, Twisting, or Doubling Cotton*, or other fibrous substances; Thomas Gadden, Saddle River, Bergen county, New Jersey, February 11.

In the arrangement of the spindle described by the patentee, the bobbin rests upon the top of a central pin which passes up and down through a dead spindle, there being a metal cap on the upper end of the bobbin, which resting upon the pin, creates the degree of friction which is necessary for the drag of the thread. The lower end of the central pin rests upon a traversing rod, or rail, by which it is raised and lowered, but is not allowed to turn round. The whirl of the

spindle is attached to a tube which revolves upon the dead spindle, the flyers being inverted, and joining the tube near to the whirl; in other respects the flyers are in the common form, excepting in having two eyes on each horn instead of one, placed, of course, one below the other.

The patentee claims "the obtaining of the drag at the top of the bobbin, by means of the plate or washer, as described, instead of the bobbin resting on the lifter rail, as is usual;" and says that when so constructed, the spindle will turn off more work, require less power to drive it, be more easily used, less expensive, and less liable to be out of repair than any other.

---

20. For a *Back for Forges;* Frederick Avery, Hamilton, Madison county, New York, February 12.

This forge back is to be a cast iron box, similar to such as have been before described, but differing from them in having that part of the side in which the tuyere is fixed, cast in a separate piece, and attached in its place by screw rods and nuts; the detached plate is to be about the size of the portion usually acted upon by the fire. This is the part claimed as new. The forge back patented by Asa Graham, December 18th, 1832, has the whole front plate cast separate from the other parts, the object in view being exactly the same as that here proposed, namely, the renewal of that part subject to being burnt out.

---

21. For an improvement in the *Form and Construction of Mill Stones;* James Preslow, Auburn, Cayuga county, New York, February 12.

The bed stone is to be in the usual form, but the upper stone or runner is to be faced in a manner differing from that generally practiced. For about two-fifths of the distance from the periphery to the centre it is to fit on to the bed stone, in the ordinary way, after which it is to be cut concave towards the eye, the space there between it and the lower stone being an inch or more. A portion, however, of this concave part is to be but about one-half the distance from the lower stone, which is allowed to the general surface of it. This concave part is intended to receive and break the grain preparatory to its being completely ground as it passes to the periphery. Three, or more, deep grooves, or channels, are to be cut into the concave part to admit air.

This mode of forming the face of the runner constitutes the principal claim of the patentee, who says that the grinding is thereby facilitated, and air admitted between the stones, preventing the immoderate heating of the flour.

---

22. For a *Balance for Weighing;* Benjamin Morrison, Milton, Northumberland county, Pennsylvania, February 13.

The balance here described consists of a beam turning on a fulcrum in the usual way, but with the dishes to hold the weights, and the articles to be weighed, placed above the beam instead of being suspended below it, for which purpose the beam is bent in the way represented in the margin, where *a* is the fulcrum, and *b b* the ends of the beam. The scale dishes are each hung on two pivots, attached to cross bars fixed on the ends *b b* of the lever, the cross bars being so curved as to pass under the dishes. From the centre of each dish a rod descends to a considerable distance down, having a weight at its lower end to prevent the upsetting of the dish when articles to be weighed are placed within it.

The whole apparatus is described, but no claim is made to any part of it; we are left, therefore, to presume that the whole is considered as new by the patentee.

Balances, or scales, upon precisely the same principle with the foregoing, have been for some time in use in this country, but they are of English manufacture, and were, we believe, patented there. A large number of them was imported, probably two or three years ago, but they did not, at first, take, and were consequently sold at auction; since which, however, they have become diffused, and a number of them are in use in this city [Washington.] There is nothing new, therefore, in the foregoing plan, nor is the proposed arrangement of the parts equally compact and convenient with that of the imported article, although identical in principle.

---

23. For *Machinery for Breaking and Softening Hides;* Stoning them in the Lime and Grainer; and Scouring and Setting Leather; Benjamin H. Aylworth, Masonville, Delaware county, New York, February 13.

A table is provided upon which the hide is to be laid; at one end of the table, posts are raised to sustain a shaft, having on it two or more cranks which, as the shaft revolves, work arms, carrying each of them a rubber and a roller, designed to operate upon the hide.

The shaft may be turned by any adequate power; the arms may be about six feet long, and have a lateral motion given to them by hand, whilst they are worked backward and forward by the cranks.

The arrangement of the machine appears to be extremely rude, and to be badly calculated for the proposed purpose; to us it is evident that the project is an untried one, and that the first attempt to operate with it will convince the patentee of its worthlessness, or lead him so to modify it as to render it useful. The drawing represents a rubber of stone or iron, on the extreme ends of the levers, and a roller about the middle of it, each of which is to act on the leather; but how they are both to be kept in contact with it, whilst the end of the lever attached to the crank is carried in a circle, thus raising and depressing it, as well as passing it backward and forward, we are unable to guess.

24. For an improvement in the manner of *Hanging and Securing the Rudders of Vessels;* Richard M. Taylor, city of New York, February 14.

There are seven separate claims made in the specification of this patent. 1st. "An universal joint, or hinge, for the hanging part of the rudder;" this consists of a hemispherical socket cast on the straps which are affixed to the stern post, and a hemispherical projection cast on the straps which secure this part of the hinge to the rudder. 2nd. "The eliptical form of the straps;" meaning thereby, that the straps of the hinge are not straight, but curved. 3d. "The several parts which sustain the rudder, and prevent its rising and unshipping." These consist, in part, of a cap and rings of a particular construction, represented in the drawings. 4th. "The elastic appendage to the after part of the rudder." This consists of cork, which by its elasticity is to prevent the effects of percussion upon the rudder. A similar appendage is applied to the bottom part "to act as a spring to facilitate its motion, reduce its superabundant weight, and operate as a repulsive power against any violent concussion from a blow upon these parts." Although the description relating to this and other parts is elaborate, it is not very clear; the model which is referred to would probably render it so, but as this makes no legal part of the description, we do not resort to it. 5th. "The appendages called the *guard*, which are secured to the wings of cork, and rudder, as will be seen by the model," &c. 6th. "The groove in the stern post, and the corresponding projection on the rudder." That is, the stern post is hollowed longitudinally, and into this fits a round, formed the whole length of the rudder, making a circular joint corresponding with the hanging of the rudder. 7th. "The manner of driving the main bolts through the rudder and stern post." These are to be driven in a diagonal direction, which, it is said, gives additional strength. Some of these claims, at least, are trifling in the extreme, such, for example, as "the eliptical form of the straps."

---

25. For the *Application of Lithography to the Printing of Books, Pamphlets, &c.;* Robert Charles Manners, city of Boston, Massachusetts, February 15.

This invention the patentee denominates TYPOLITHOGRAPHY. The mode of proceeding is to have a copy of the work to be transferred to stone, printed with the kind of ink adapted to that purpose, or with any kind of ink which will answer the intention. The patentee says that he does not claim to be the inventor of copying generally by lithography, "but to be the inventor of the application of lithography to the purpose of reprinting such printed works as aforesaid." This "invention of the application" appears to us rather equivocal, as there is no pretence made to novelty, excepting in applying the transferring to the printing of books. Now every one having any acquaintance with lithography, knows how to make such transfers, both from letter press, and copperplate printing; it has often been spoken of in publications on the subject, and some few months since

it was announced in the journals of the day, that a mode of transfering the common ink, even from old books, had been discovered in Europe, by means of which copies of them might be lithographically multiplied with great facility.

---

26. For an improved *Stereotype Block;* Enoch Hale, Boston, Massachusetss, February 15.

This resembles so closely the first stereotype block which we recollect to have seen in use, that we really cannot tell the difference between them; they seeming to us to be much like some twins whom we have known, bearing so strong a likeness to each other, that it was necessary to see them together in order to distinguish them from each other. There are the usual two fixed clasps on one side of the block, and two movable ones on the other; two screws, the heads of which work against the plates of the fixed clasps, pass through the block and into tapped holes in the movable clasps. The heads of the screws may be formed into pinions, and turned by a suitable instrument; or they may be turned in any other convenient mode. "The invention consists only in the form, and manner of adjusting, the nuts."

---

27. For an improvement in the *Flyers of the Common Spinning Wheel for Flax;* James Wilson, Monroe county, Kentucky, February 16.

This improvement consists in making the flyers of brass, or other metal, instead of wood; the metal to be about one-sixteenth of an inch in thickness, and half an inch in width. Instead of the wire hooks inserted in the wooden flyers, there are to be holes drilled through the metal, with a slot on one side to insert the thread. "The flyer made upon this plan runs lighter and steadier than any other kind known in the United States, and will last for ages." So says the patentee. We have seen brass flyers attached to a spinning wheel many years since; the wheel was made for the parlour, and finished in all its parts in parlour style. How many other flax wheels may have been made with metal flyers in or out of the United States, we cannot tell, but if we needed it, we should unhesitatingly apply this substance instead of wood, maugre the terrors of the patent law.

---

28. For a *Cooking Stove for Wood or Coal;* Leopold Gotta, Huntingdon, Huntingdon county, Pennsylvania, February 18.

The merit of this stove, if merit it may be called, consists in the great number of its contrivances, intended to accommodate it to a great variety of purposes. The stove, as shown in the drawing, is round; the body of it, immediately above the fire, constitutes a boiler for containing water. A steam vessel for cooking meat stands with its lower part within the boiler, a steam pipe from which also enters its interior. Other steam chambers for vegetables, &c. may be similarly placed, each having pipes to discharge the redundant steam. For baking bread and cakes, there is an oven within a kind of drum

in the flue, surrounded by the heated air from the combustion. The stove is surmounted by a cover which encloses the steaming apparatus. This cover is to be raised from the stove by cords and pulleys when the viands are to be placed in, or removed from, the steamers. From this cover a general waste pipe ascends, to carry off the vapours arising from the steamers, and the articles contained in them.

The claim is to "the before described stove;" a claim which of course limits the patentee to the exact mode of arrangement given in the specification; this, we apprehend, is perfectly proper, as there is nothing new in it, excepting the particular mode of construction. The main objection to it appears to be its complexity, a circumstance which in the hands of ordinary servants destroys the usefulness of any apparatus, however good it may be in those of a person who is intelligent, careful, and interested.

---

29. For a *Balance or Weigh Scales;* John Baptiste Maag, city of New York; an alien who has declared his intention to become a citizen of the United States. February 19.

This machine is the well know instrument for weighing wagons, &c. with their loads, and although there is a distinct claim made, we do not think that the main point which is relied upon is novel in its character. There are four levers under the platform, upon which it, with the load upon it, bears, their united action being on a fifth lever which leads to the rod operating on the scale beam; and the claim is to "the disposition and distribution of the whole weight equally upon the four lower levers, so as to unite their powers with the total weight," in a point on the fifth lever, "together with the construction, position, and combination of the lower levers."

The scale beam, or balance, has its fulcrum supported upon a rod which descends into a vertical post, and has teeth on one side of it, forming it into a rack, there being a pinion by which it can be lowered or raised, in the manner of many of the finer kind of scales. The rack is in the specification called a "serrated iron bar," and the crank and pinion are denominated the windlass and wheel; and the use of them is claimed as new.

We are not able to discover any thing in this apparatus rendering it superior, either in accuracy, convenience, or simplicity, to such weighing machines as are already in use.

---

30. For *Constructing Evaporating Vessels, and purifying, and extracting Acids from, Sugar, Cane Juice, Beer, Cider, and Wine;* John C. Douglass, Cincinnati, Ohio, February 19.

The specifications of patents are, in the United States, public documents, and the making them such has been deemed necessary to the security of the community against those impositions which would be likely to result from the placing them under seal; it is the right of every citizen to obtain copies of them, and to carry them into court as evidence; it is also the duty of a public journalist faithfully and fearlessly to make known those facts which it is within the line

of his profession to publish; for ourselves, we have endeavoured to do this heretofore, and we shall continue to pursue the same course.

We have been induced to make the foregoing remarks in consequence of a request made by the above named patentee that his specification should not be exhibited so as to admit of any publication of it being made; so far as it was in the power of the office to comply with this request, it has been done; that is, the specification has not been voluntarily shown, but the editor has claimed his right, as a citizen, and examined it. It frequently happens that patentees have a good reason for wishing the publication of their patents delayed; as, for example, when they are taking measures to secure them in foreign countries, and in such cases we uniformly comply with their requests, and promise a future notice. In the present instance, however, there was no such intimation given, and as nearly six months have elapsed since the issuing of the patent, we can perceive no *good* reason for further delay.

After so long a preface it may be expected that our remarks upon the patent will also be prolix, and were we to make the specification our model, this would be the case, as, we believe, it contains from twenty to thirty pages of tolerably close writing, and refers throughout to accompanying drawings. We have done little more, however, than turn over the pages, and look at the claims, where, among several other things *equally novel*, we find the use of whiting for correcting acidity, and of charcoal for filtration. For saying no more upon the subject we have two reasons; in the fist place we have not discovered any thing to repay us for lengthened remarks, and in the second, we are just about to send our copy to the printer, who is waiting for it.

---

31. For a *Balloon Calash, or Ladies' Hat Case;* Harriet B. Cook, Onondaga, county of Onondaga, New York, February 20.

The difference between this calash, and those used by our great grandmothers, and their female progeny in modern times, appears, so far as we can comprehend "the construction and operation of the said machine," to consist in a couple of stretchers, the ends of which are to be received by snaps, or catches, "which will form it into the balloon calash, or ladies' hat case, to wear over ladies' bonnets, to preserve them from injury by storms, or otherwise, when travelling."

As we expect shortly to take a journey in the public stage, we feel a little alarmed at this new appendage to the inflated habiliments of the ladies. To be jammed close, and kept warm, between two fine women, might serve to counterbalance many of the miseries of travelling; but to be placed behind two pair of Bishop's sleeves, with the addition of two balloon calashes, depriving one of seeing out of, or being seen within, the stage, is really appalling. In former times a gentleman might sometimes put his *coat sleeve* around the waist of a lady, to steady her in passing over rocks and ridges, but the envelops by which they are now fortified, are more effectual preventives of all contact, than would be the motto of *Nolle me tangere.*

32. For *Gum Elastic Shoes;* Nathaniel Ruggles, Bridgeport, Fairfield county, Connecticut, February 20.

An insole is to be laid upon a last furnished with an iron sole, and over this the gum elastic shoe is to be stretched. A welt is then to be laid round the edge and nailed through with nails having heads. To this welt the outer sole and heel are to be sowed in the usual manner.

The claim is to "the mode or process of attaching the outside sole and heel to gum elastic boots or shoes by means of a welt nailed as aforesaid: and in every respect in which the aforesaid mode or process may differ or vary from any or all other modes heretofore known."

A patent was obtained on the 21st of May, 1832, for attaching leather soles to gum elastic shoes, which is noticed at p. 391, vol. x. There was more brevity in the specification of the former patent, as well as in our notice of it, than in the present, but they both appear to be essentially of the same species, and as the one first described was also the first-born, it will appear to be the heir at law. The claim made in the present patent, to all things which may differ in the mode adopted by this patentee, from any heretofore known, is at least surplussage; it is his business, and duty, to tell what he patents, and he will not be aided by a notice that "man traps and steel guns are set in these grounds." The nailing of the welt, we suppose, is the principal thing relied on in the case before us.

The patentee declares that he made his "invention on the 2nd day of February, 1833, and reduced it to practice on the 5th day of the same month."

---

33. For a *Check and Brace Bridle;* William F. Pendleton, King and Queen county, Virginia, February 20.

The great object of this check and brace bridle, is to cause a piece of metal to press against the under jaw of the horse, by means of a check rein constructed for the purpose. The bit is a stiff bit, in the common form, but it has a semicircular piece of iron attached to each end of it, and passing round under the jaw of the horse, giving to it a form something like that of a stirrup, the straight part of which would represent the bit. To the middle of the semicircle is attached a lever, the part which in a stirrup would be the eye for the strap, serving as its fulcrum. The lower part of the lever descends, and has the check rein attached to it, whilst the upper part, that ascends, has a curved plate of metal on it, which, when the check rein is tightened, presses forcibly against the jaw. There are thongs and rings attached to the saddle, and passing over the neck of the horse, to guide the check rein, and cause it to act upon the lever in a proper direction. The rein, check bit, and brace, it is said, enable the rider to keep the horse's head and neck in a proper position, as well as to stop him at pleasure. The claim is to the peculiar arrangement above described.

---

34. For an improvement in the manner of *Hanging and using*

the Stones in Grist Mills; James M'Duffie, Bradford, Orange county, Vermont, February 21.

The spindle and driver are to be in one piece, the driver consisting of two arms extending out at right angles from the spindle; they are to be let into the runner, and made fast to it by melted metal, or by nuts and screws. A bridge tree is placed above the spindle, which being forced down by screws serves to keep a light and small stone from rising.

There is no claim made, nor is there any thing new in fixing the spindle firmly to the runner, yet upon this, if upon any thing, the patentee appears to depend.

---

35. For an *Improvement in the Quadrant*, patented by Phineas Spear, on the 19th of March, 1830. Francis G. Clarke, Portland, Cumberland county, Maine, February 21.

Without a drawing, it would not be possible to give a clear description of the arrangement upon which the proposed improvements depend. The patentee states that this instrument is distinguished from Spear's quadrant, by employing a semicircle and weights instead of a spirit level, to determine the position of the quadrant, or sextant; by the number and position of the lines; by the arch and index; and by the spring and principle of adjustment. The "design of the whole apparatus is to enable the navigator to ascertain his latitude when the horizon is obscured by fog, or by any intervening object, either from the meridian altitude of a celestial body, or by double altitude; and also to obtain the altitude of the sun in order to ascertain the longitude by chronometers, when the horizon cannot be seen."

We apprehend that however applicable instruments to be adjusted by a spirit level, or by a hanging weight, may be on shore, the practical difficulties in the way of using them on ship board will still be such as to prevent the employment of them there, from their not admitting of that accuracy which is so essential to security.

---

36. For a *Composition for Drying Oil Paints;* Nathan Hemenway, West Springfield, Hampden county, Massachusetts, February 22.

The composition is formed by taking umber, sugar of lead, white vitriol, and litharge, of each one pound, and adding thereto two pounds of white lead, and half a pound of shellac, red lead, and blue vitriol.

The *acids* of these materials are to be extracted by heat, for which a furnace may be used, having a bottom and sides of brick, and a top of sheet iron. The oils are to be used without boiling.

The foregoing contains all the information given; this, however, is not much to be regretted, as the whole thing is altogether ridiculous. The patentee has certainly made a fine assemblage of dryers, with the exception of the shellac, which in his composition will be something like "chips in porridge." About the *acids* that are to be ex-

pelled there is some mystery, which the brick furnace, with its iron cover, does not enable us to explain

---

37. For an improvement in the *Spinning Mule*, called the "Improved Mule Head;" Henry Hopkins, Providence, Rhode Island, February 22.

The improvement here patented is designed, among other advantages, to obviate the inconveniences which result, in the common mule, from the throwing the mandorer wheel out of gear at every stretch of drawing out the carriage, and especially the waste of yarn and loss of time not unfrequently produced from the wheels not at once entering into gear on the return of the carriage. By the application of an engaging and disengaging apparatus called the "ratchet wheel and dog" to the mandorer shaft, all the wheels connected with the operation of drawing the carriage out, are constantly kept in gear.

In the ordinary mule it becomes necessary to throw the mandorer wheel into gear by hand, in order to shorten the stretch of the yarn, as the cops become formed; an operation requiring considerable skill, and continued attention. Under the present arrangement nothing is more necessary than to shorten the distance to which the carriage is drawn out, the operation of engaging and disengaging being self-acting and certain.

In the drawings in the patent office the arrangement of the machinery is clearly shown, and is manifestly well managed.

---

38. For an apparatus called a *Steam Generator and Refiner;* John L. Hinkle, Hanover, York county, Pennsylvania, February 23.

This "generator and refiner" of steam, may, it appears, be applied to kettles and boilers of various descriptions, but is peculiarly applicable in the art and mystery of distilling ardent spirits, in which its merits are so great that, according to the patentee, it has "power to increase and refine the steam in kettles for distilling spirituous liquors; it will reduce the fiery flavour; refine and mellow the liquor, as if it had age; save fuel, and produce more spirits from the same mass, and that in less time than by the present mode of proceeding."

Besides all the foregoing advantages, we are informed that although the steam is more rapidly generated, it will have less tendency to burst the boilers, the generation being effected at a reduced temperature. It generally happens that in great inventions we are as much surprised at the simplicity of the means employed, as we are gratified by the utility of the effect produced, and should the patentee not have deceived himself in the present instance, his invention will serve to confirm this sentiment. If so, however, there must be something more in it than meets the eye, something occult, or at least so recondite, that to discover it demands more knowledge, and better optics than we possess; although the mode in which his apparatus is to produce such effects may be inscrutable, its construction, however,

is so simple, that of this we can give a perfect idea without the assistance of a drawing, and thus enable each of our readers to form his own judgment of the thing, which may be attended with the further advantage of inducing some of them to throw light upon the subject.

Supposing the *generator and refiner* to be applied in a still, it is to consist of three concentric tubes, one placed within the other, open at both ends, and leaving a space between each; the following dimensions are given in the specification as an example of what may be their sizes. In a still kettle twenty-eight inches in height from the bottom to the top of the neck, and there fourteen inches wide, the outer tube may be ten inches in diameter, and twenty-one long; the second tube, seven inches by twenty-three, and the inner one four inches by twenty-five. These are to be so connected as to be concentric, and to stand vertically in the still, having feet which keep them an inch from the bottom. The tubes may be made either of metal or of wood, so that, it seems, their being good conductors of heat is not necessary to the exercise of their generating and refining powers.

Similar tubes are to be laid longitudinally in horizontal cylindrical steam engine boilers, or the tubes may be varied in their forms, to suit the purpose to which they are applied.

---

39. For an *Inclined Water Wheel;* James Wood, La Grange, Fayette county, Tennessee, February 26.

The placing of buckets on the periphery of an inclined wheel, for the purpose of taking advantage of small falls of water, has been repeatedly proposed, and sometimes patented; but such wheels, we believe, have never been continued in use. The present plan is intended as an improvement upon those which have preceded it, but we predict that the same fate which has befallen them, will, at an early period, arrest the progress of this wheel.

The buckets which are to receive the water from a spout, consist of separate boxes placed round the wheel, close to its periphery; these boxes are hung on pivots, or gudgeons, near the middle of their bottoms, and as they receive the water on the descending side, the boxes are kept in their places; when, however, they pass the lowest point, and begin to ascend, the water flowing towards the opposite end of the box, cants it upon the pivots, and the water flows out: by means of a roller underneath, acting as a cam, the boxes are returned to the proper position for receiving the water, previously to their again passing under the trough. The claim is to the construction of the wheel, and particularly to the manner of forming the buckets to turn on centres.

It will be readily seen that the power which is to cant the buckets being the gravity of the contained water, it must ascend to a sensible height on the inclined wheel, before it will be discharged, and that there must necessarily be a proportionate loss of power. This, however, is not the only objection which may be urged against the present contrivance; but as we think that its defects will be obvious to the experienced mechanist, we deem it unnecessary to say more.

40. For *Improvements in the Double Napier Printing Machine;* Sereno Newton, city of New York, February 26.

Without the use of engravings, we cannot show the manner in which the patentee has constructed those parts of the double Napier printing machine, which constitute his improvements; they, however, have been fairly tested, and are approved. One of the improvements consists in the application of grippers, in the manner described, for the purpose of seizing the paper, and carrying it forward to receive the impression, in "a printing machine the cylinders of which make three revolutions to one impression." The apparatus which acts upon the grippers is withdrawn, laterally, during two revolutions of the cylinder, but it may also be applied to printing machines the cylinders of which make but two revolutions to each impression, and this application of it is also claimed. Another of the improvements consists in a mode of *perfecting* the sheets, or making register, in book work. The points which pass through the sheets are withdrawn, at the proper time, by the action of an eccentric attached to the end of the arbor which supports the grippers, and this particular arrangement is claimed in its application both to the double and single cylinder printing machine.

---

41. For an improved *Double Cylinder Register Printing Press;* Sereno Newton, city of New York, February 26.

Among the most celebrated of the printing presses which have been invented in England, and which have facilitated the business of printing to an extent which is truly astonishing, those of Mr. Napier, and of Cowper, and Applegarth, stand conspicuous. The improvement for which Mr. Newton has obtained the present patent, is for a modification and combination of certain parts of each of these presses. In England this could not have been done, the separate parts belonging to the respective patentees; the combination made by Mr. Newton, if it had been thought of there, would have required the concurrent consent of each of the parties. What is now claimed as new is the "combining that part of the Napier printing machine which constitutes the bed, and its appendages, with the cylinders, and such other parts of the superstructure of the Cowper and Applegarth's printing press as are employed in the receiving and conveying of the sheets."

---

42. For *Machinery for Sawing, Moulding, and Polishing Marble and other Stone;* Isaac D. Kirk, city of Philadelphia, February 26.

The marble to be sawed is placed upon a frame, or carriage, which is to slide on horizontal, or inclined ways, and is to be drawn on by a weight over a pulley, or otherwise. The saw is to work vertically, like a saw mill saw, and is to be made of copper or other metal. Sand and water are to drop from a hopper on to the kerf. So much for the sawing part, and respecting the moulding and polishing, we hear but little, all that is said being "For moulding the same principle as for sawing; for polishing I have the buffs placed in the place of the saw." There is no claim made, and the whole description is

meagre, crude, and undigested. All we have learnt of the mode of sawing is derived from the drawing, but this throws no light upon the other processes mentioned.

---

43. For an improvement in the mode of constructing a *Back for a Forge;* patented December 15, 1832. Patent surrendered, cancelled, and reissued, February 26, 1833. Asa Graham, Hamilton, Madison, county, New York.

We refer the reader to our notice of the former patent for the description of this forge back, it being precisely for the same thing; namely, the casting the front plate, which forms the forge back, in a piece separate from the sides, to admit of its renewal, and to prevent its acting injuriously by its expansion, on the other parts of the box. The examination which we have made of the new specification has not shown us the reason for the surrender and cancelling of the former; perhaps, however, a critical comparison of the two might have furnished an explanation, but the question is of little importance to any one but the patentee.

---

44. For a *Forcing and Suction Pump for Fire Engines, &c.* John F. Rodgers, Waterford, Saratoga county, New York, February 27.

The chamber of this pump, or engine, is a cylindrical drum, placed so that its axis shall stand horizontally. The length of the cylinder, internally, may be six, and its diameter fourteen, inches. It has double heads at each end, allowing a water way between them. The cylinder is truncated or cut off, above and below, forming flat valve seats; it is also divided into two chambers by vertical partitions extending from the shaft in the centre, to the middle of the valve seats. The pistons consist of two wings, attached to the shaft which passes through stuffing boxes in the heads. The levers are worked like those of the ordinary fire engine, causing the valves to vibrate in the cylindrical cavity. The valves and the water ways are so arranged as to cause each of the semicylindrical cavities to operate as a double pump, the water flowing in on one side of each piston, whilst it is forced out into an air vessel on the other. On to the lower part a suction hose is to be fixed, and when this is unscrewed it opens a passage into the interior of the chamber, through which the hand may be admitted, should it be required for any purpose, such as adjusting or cleaning.

The claim is to "the piston with its form and principles of double action, by which each wing compresses water at one and the same time, with equal force; together with the lateral passages provided for it to pass through the cylinder into the air barrel. And also the method of attaching the hose or suction pipe to the engine, with the opening provided for examining, and warming, or drying, the inside of the pump."

This pump is a mere variation of Rowntree's fire engine pump, but is inferior to it, in having two pistons instead of one, which in Rowntree's produces the whole effect of the two, whilst the arrangement of

the water ways, in that pump is such as to offer less obstruction to its passage, its direct course being less changed. The valves in Rowntree's may also be more readily come at than in the one now patented. Rowntree's pump is described in Nicholson's Operative Mechanic; in the various Encyclopedias, and in nearly all the modern works which treat upon the subject of hydraulics.

---

45. For an *Edge Rail and Chair for Rail-roads;* William B. Mitchell, city of Philadelphia, February 27.

(The specification will appear in the next number.)

---

46. For a *Machine for Breaking Clay for Brick;* Nathaniel Boynton, Danville, Caledonia county, Vermont, February 27.

This is the common pug mill used in potteries from time immemorial. It consists of a cylindrical vessel standing vertically with a shaft made to revolve in it, carrying knives, the blades of which stand obliquely, passing between stationary knives fixed on the inside of the cylinder. All claim has been omitted, and, as we think, very properly.

---

47. For a *Machine for Hulling and Cleaning Clover;* Thomas Gollogher, Fairfield county, Ohio, February 28.

This machine consists of a fluted cylinder and concave for rubbing the seed, which is fed to them by a hopper; it has also a wind wheel and two sieves, all of which are very much like a great many others; the patentee, however, has found many things to claim, as will be seen by the following declaration.

"I claim as my own invention in the above described machine, its outward and internal construction; the feeder, cylinder, concave, and wind board. I also claim to have improved the fan and shaking apparatus so as to conduce to the operation of the machine. And I claim as my own invention the result of the united operation of the whole machine."

This is certainly claiming both by wholesale and retail, as regards the construction of the apparatus, besides which we have a novel claim in the result of the whole machinery, which result is the rendering of clover seed clean from the hulls. As to the improvements in the shaking apparatus, and the wind board, we find them in the claims only, nothing respecting them appearing either in the specification or the drawing.

---

48. For an improvement in the *Saw Mill;* Henry Gordon, Liberty, Adams county, Pennsylvania, February 28.

The saw frame instead of working between fender posts is to be suspended by vibrating arms, four above and four below, one half of them attached to the back, and the other to the sides of the frame. These must have segments of circles at one of the ends of each bar, or at least to those at the sides of the frame, or they must be attached to a second vibrating bar; the mode of attachment, however, is de-

scribed in very general terms. The log is to be drawn back by the weight of a bucket to be filled with water, and tilted when it has descended. Some other novelties are mentioned, but none of them appear to be worthy of particular notice. The hanging of saw frames upon vibrating bars, in different ways has been patented more than once; it, however, does not appear to offer any advantage over well constructed slides, or fender posts.

---

49. For a *Machine for Making Cooper's Rivets;* Timothy Allen, Plymouth, Plymouth county, Massachusetts, February 28.

This is a machine for cutting off the wires, or rods, into proper lengths for a rivet, and impressing the heads upon them by suitable dies. The operation of the machine is not rendered clear by the description and drawing, but it manifestly resembles, in several particulars, other machines for heading rivets and screws; there possibly may be some novelties of arrangement sufficient to entitle this to the character of a new machine, but, if so, they are not made plain. The claims are to "the conveyance by the punch, and holding the rod whilst headed by the punch. The solid cast iron die is applied to making rivets by one operation."

---

50. For a *Machine for Thrashing Grain, Shelling Corn, and Breaking and Dressing Flax and Hemp;* Wrestcum P. Barton, Batavia, Genesee county, New York, February 28.

This is the common cylinder thrashing machine, having beaters, and a concave; when used for hemp or flax it is said that "the flutes and notches on the prominent edges of the concave may be dispensed with;" we apprehend that for these purposes it would be best to dispense with the whole machine. How it is to be employed for shelling corn, is left to the judgment of the operator.

---

51. For an improvement in the *Mode of Building Dams;* Samuel J. Burr, Chambersburg, Franklin county, Pennsylvania, February 28.

This dam is to be curved up the stream, or is to be in the form of an arch laid on its side, the two banks of the stream forming the abutments of the arch. The water is not to be allowed to fall perpendicularly over the edge of the dam, but it is to be so banked, or built, as to form an inclined plane. The great point insisted on, however, and that for which the patent is taken, is the giving strength to the dam by its arched form.

How much novelty there is in this plan may be judged of from the subjoined quotation from Oliver Evans' Millwright's Guide, published about forty years ago. Speaking of dams, he says, build them "so that the pressure or force of the current, will press their parts more closely together."

"If the dam is built of stone make it in the form of an arch or semicircle standing up stream, and endeavour to fix strong abutments on each side, to support the arch; in the laying the stone put the

widest end up stream, and the more they are forced down, the tighter they will be pressed together."

---

52. For an *Edging Iron, or Grooving Roller, for Grooving Tin Plates,* and other sheet metal; Charles Fisher, York, York county, Pennsylvania, February 28.

Two rollers are to turn in a frame, like flatting mill rollers. They may be made wholly of iron, or with the exception of the grooving part, wholly of wood. Along one of the rollers a groove is made of about one-eighth of an inch in width, and three-eighths in depth. The groove does not point to the centre, but is like a kerf along the roller, which would be made by a saw intended to cut off a thin segment of the roller.

The claim is to "the exclusive right of an edging iron, or grooving roller, in which the tin plate, sheet iron, sheathing copper, &c. is put, and the edge turned, in one or two operations, from one extremity of the tin, iron, copper, &c. to the other; and also the right to the use of the rollers for edging."

Various grooving irons have been made, and are extensively used for the above purpose; no general claim, therefore, to such an instrument can be valid, although the particular construction of a machine differing from the others would be a good subject for a patent.

---

53. For a *Machine for Shaving Leather;* James Reilly, Waynesborough, Franklin county, Pennsylvania, February 28.

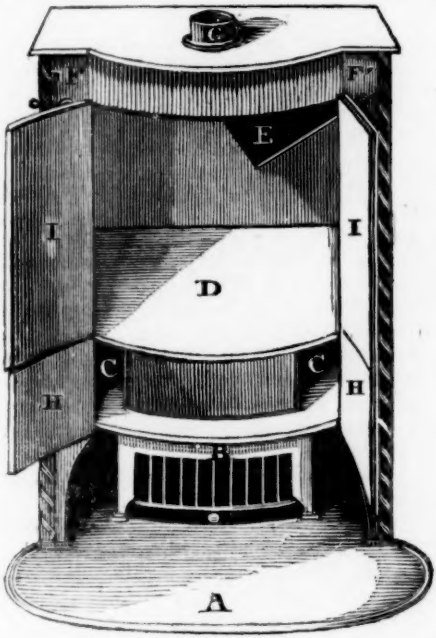
The leather to be shaved is drawn along, by the turning of a roller, between a knife, and a plate of iron, which may be so raised or lowered as to regulate the thickness. There is also a contrivance for shaving the leather tapering, by turning a roller, hung eccentrically, under the iron plate before named, which raises the plate as the leather proceeds. There is a general claim to the machine which can hardly be sustained, machines for the same purpose having been heretofore made, in a similar way. The apparatus for cutting the leather tapering, for covering whips, and other purposes, is probably new, and would, therefore, have been the proper subject of a special claim.

SPECIFICATIONS OF AMERICAN PATENTS.

Specification of a patent for a "Shifting Cooking Stove." Granted to HENRY CRESSMAN, *city of Philadelphia, February,* 1833.

To all whom it may concern, be it known that I, Henry Cressman, of the city of Philadelphia, and state of Pennsylvania, have invented an improvement in the stove intended, principally, for cooking with anthracite coal, which I denominate the shifting cooking stove, and that the following is a full and exact description thereof.

In the construction of the grate for holding the fuel, there is nothing peculiar. It is sustained upon the bottom plate of the stove, which I generally make with a lap, resembling that of the common Franklin stove, which I usually perforate to allow the ashes to fall into a drawer below the plate; this admits of the placing the grate lower than it could otherwise be placed, and renders it the more convenient. A, in the accompanying drawing, represents the bottom plate, and B the grate. The upper part of the grate passes through a plate C C, into which it is fitted. The front containing the bars, and the back and end plates, may be made in separate pieces of cast iron, and the back and ends may be lined with fire brick, if preferred.



At a convenient height above the plate C C, is placed another plate D. A height of four or five inches will allow of sufficient room for supplying the grate with fuel. The grate is surmounted by an oven of which the last described plate forms the bottom, when the stove is used for cooking. The plate C extends to the side and back plates of the oven; but the plate D does not touch the side plates by two or three inches, or such distance as may be thought requisite for the flues which are to ascend on each side of the oven. The plate D is hinged, or works upon pins, on its back edge, so that it may be turned up against the back plate of the oven, when not required for cooking; it may also be so fixed that it can be lifted out altogether. This plate,

by its turning back, or removal, constitutes one of the shifting parts of the stove.

The inner side plates, between which and the end plates of the stove are the spaces for flues, are also made to shift, so that when the plate, D, is turned back, and these side plates are removed out of the way, the space which before constituted the oven, forms merely an open chamber above the grate. These inner side plates, I divide on each side into two; the lower division falling into ledges prepared for them, and passing a little below the ends of the plate D, and extending up to about one-half of the height of the oven. The upper divisions are hung upon joints, so that they may be turned up against the top plate of the oven. One of these is shown in the act of being turned up, at E. The cranks, or handles, F F, serve to shift these parts, and are provided with catches which latch them in their places. When they are down, the flues on each side are complete, and the heated air is compelled to pass within them. When up, the heated air is diffused through the whole space of the oven, which will rarely be found objectionable in cooking, but they may be removed and replaced instantaneously.

The top of the stove is formed of two plates, to conduct the heated air to the pipe G.

Provision is made in, or on, the inner plates to put bars across the oven to rest dishes on, so that whilst some articles are being cooked on the shelf D, others may be placed on these bars, and form tiers above them. Cooking, &c. may be performed upon these, over the open fire, when the plate D is thrown back.

The folding doors which enclose the stove I divide into two parts H H, and I I; the lower parts serving to enclose the space between the grate and the oven, and the upper parts enclosing the oven proper. The lower doors serve also to regulate the heat, accordingly as they are opened or closed.

In the use of this stove there are various arrangements which will be found useful, and which experience will suggest. The following will often be found convenient. The lower side plates may be taken out, and the plate D, lifted up and laid on the ledges in which the lower inner end plate slides, when by turning down the upper end plates, a smaller oven will be formed, and more space allowed above the open fire, for cooking in other ways.

This stove may be altered in its form, and in the particular arrangement of its parts, whilst those features which constitute the difference between it and other stoves for cooking and for heating apartments, are still retained. It is these alone which I claim as my invention, and for which I ask a patent. They consist of the shelf D, and the inner shifting plates of the side flues, by which this stove may be converted into a simple open stove, or have an oven formed in it, at pleasure, whether the same be effected in the exact way which I have indicated, or in any other operating upon the same principle, and producing similar results.

HENRY CRESSMAN.

ENGLISH PATENTS.

To Frederick William Isaac, *ivory, tortoise-sheel, and pe rl worker, for his having invented certain improvements in ornamenting the finger keys, and other parts of piano-fortes, organs, and other musical instruments. Sealed June* 28, 1832.

The above invention of improvements in ornamenting the finger keys of piano-fortes, organs, and other musical instruments, is described by the patentee to consist in new and improved modes of covering those parts of them, which are usually either veneered with ivory, or made of ebony, with pearl, tortoise-shell, turtle-shell, or other fit and proper, rich and beautiful materials, so as not only to add greatly to their splendid and elegant appearance, but also, from the superior hardness, glossiness, or high polish of their surfaces, to facilitate the rapidity of the fingering in the performance of quick and brilliant passages in musical compositions.

In covering the finger keys with pearl, the patentee employs the following improved method, which is described in the specification in the following manner:—

"Instead of merely cementing flat plates, or lamina, of pearl to the wooden parts of the keys, by means of glue, as usual, I compose a superior cement in the following manner: to a solution of the best Salisbury or other English glue made in a leaden glue pot, with fresh ale, of a proper consistency, I add a small quantity of isinglass which has been previously dissolved in a mixture of ale, and of ascetic acid or vinegar, by a gentle heat, and also a little boiled linseed oil; and when the whole have been thoroughly incorporated by stirring them together at a simmering heat, I add a sufficient quantity of the fine German carbonate of lead, called 'Khrem's White' in commerce, or the finest plaster of Paris, finely powdered and sifted, to give to the cement a uniform white colour. The intent of these additions to the solution of glue being to give it the power of resisting the atmospheric changes of heat and cold, and moisture and dryness, and also to suit it to the white colour of the pearl, and therefore these said additions must be varied in their proportions accordingly, and agreeably to the different qualities of the said component materials.

"In addition to this superior cement, and especially to guard against the ill effects of hot climates, I introduce between the lamina of pearl and the wooden part of the keys, a slip of cloth, such for instance, as hempen, linen, or cotton shirting, or of woven silk, or the fine woollen fabrics, known as cashmeres or merinos, or cloths of any other materials, and of about the same thickness as the above; or instead of cloth, slips of vellum, or parchment, may be also used with advantage, the intent being to counteract the great tendency of glue to shrink and contract in drying, and thereby cracking and loosening by the introduction of the above, or similar, partially elastic and yielding materials.

"I fill the pores or interstices of the said cloth with the above

composition, or improved cement, by laying it upon the wooden part of the finger key, and by repeatedly striking the brush, or Dutch painter's tool filled therewith, upon the surface of the said cloth, until it is completely saturated therewith, and the cement passes through, and effectually binds the cloth to the wood, when they are to remain till they become perfectly dry. I then coat the surfaces of the cloth and of the pearl, with the cement, in a similar manner as when the common glue is used, and laying them together in their place, I employ the heated caul in the ordinary manner of veneering, to press the parts together, and to expel the extra quantity of cement which would otherwise remain.

"In using vellum or parchment instead of cloth, I merely brush it over with cement, instead of striking the brush upon it in the manner above described.

"When the cement is become hard, the pearl is to be cleaned off, and prepared for polishing in the German manner; first, with pumice stone, powder and water, and then with rotten stone, powder and sulphuric acid, applied upon a soft woollen cloth, with which the pearl must be rubbed until a beautiful polish is obtained. I can also employ the above cement and cloth, vellum or parchment, in veneering the finger keys with ivory, and with similar advantages.

"In veneering the short finger keys with tortoise-shell or turtle-shell, I employ a similar cement to that before described, only that it is coloured yellow, green, maroon, red, black, or of any other colour required, by using properly ground and sifted colours accordingly; I likewise have the cloth dyed of similar colours, and cement it upon the wooden parts of the keys, in the manner above mentioned. I then apply the tortoise-shell or turtle-shell with the cement, in the usual manner of veneering with tortoise-shell; and, lastly, polish it also in the usual way."

In order, however, to facilitate the process of veneering the short finger keys with tortoise-shell or turtle-shell, as well as also to render it more durable, and instead of laying the shell upon the wood in several parts or pieces as usual, the patentee forms the shell into a solid cap or coat, in the shape of the key by means of male and female dies employed in a screw press of the common construction, and immersed in boiling salt water.

The boiler described in the specification to be used for this purpose is a square cast iron or other metallic box open at the top, and placed over a small furnace or German stove. The press and shaping dies, with the tortoise or turtle-shell to be operated upon, are placed within this boiler, and submitted to the action of boiling salt water. On the top of the press there are two projecting pieces, or stretchers, to steady the press in the boiler, and on the sides of the boiler are formed guides to steady the bottom plate of the press within the boiler.

The pair of dies employed for this purpose are of the required shape, to form two coverings or veneers for the short finger keys at one time; the lower die containing the recess is placed upon the bottom plate of the press, and the upper one is moved up and down the press of the screw between guides in the usual manner.

The projecting part of one die is made to fit the hollowed part of the other die, in such a manner as to allow of a sufficient thickness of tortoise or turtle-shell to lie between them when compressed by the action of the screw of the press (which is turned by a lever projecting over the top of the boiler,) so as to form two caps or coats in length at one pressing, which may be afterwards cut into two parts, or coverings, for the short finger keys.

Having described the methods of ornamenting the finger keys of musical instruments, the patentee proceeds to describe the other parts, to which these improvements are applicable, and proposes to ornament "the name boards, the key slips, the cheek pieces, and the candle boards; all these may also be advantageously veneered with tortoise or turtle-shell, or with buhl, at discretion, by employing the above mentioned improved cements, and introducing the cloth, vellum, or parchment in either of the before mentioned methods; and further states, in conclusion, I can likewise greatly improve the art of veneering the cabinet, or wood parts, of musical instruments with common glue, by introducing a bed of linen, hempen, or cotton sheeting, in the above manner. I do not mean or intend hereby to claim as my invention any of the various means or methods herein mentioned which may already have been known or in use; but I do hereby claim the introduction of the woven fabrics, or cloths, or vellum, or parchment, in order to afford a degree of elasticity to the glued or cemented veneers; and I likewise claim the formation of the tortoise-shell and turtle-shell caps or coats for the short finger keys, in one solid piece, by means of the screw press and dies, instead of veneering them with separate pieces." [*Lond. Jour.*

For improvements on the Steam Engine, and in the application of steam power to navigation, and to locomotion. RICHARD TREVITHICK. *March* 19, 1833.

In the "Repertory of Patent Inventions" for May last, the specification of this patent, with drawings, is given at length; a clear idea of the proposed improvements, however, may be obtained from the statement of the things claimed by the patentee, which we give in his own words.

"Now whereas I claim as my invention, firstly, the interposing between the boiler and the working cylinder of the steam engine, a long, many-curved, heated pipe, through which the steam is forced to pass with great rapidity, without being permitted to come into direct contact with water, by which arrangement the steam is made to absorb additional heat, and, at the same time, allowed to expand itself into a greater volume. Secondly, placing the working cylinder of the engine within such part of the flue or chimney as shall insure the

cylinder to be kept hotter than the steam used in it, by which means the expanding of the steam is still further promoted. Thirdly, propelling a navigable vessel by the force of the recoil, produced from water received, with a moderate degree of velocity, into a receptacle near within the stern, in the direction of the course of the vessel, and ejected with great velocity in a direction opposite to that course, the velocity of the jet being at least double the required speed of the vessel to be propelled, provided always that the same be effected in the manner heretofore described. Fourthly, applying a boiler combined with a steam expanding apparatus, as before described, instead of a boiler alone, to a locomotive engine, whereby the power of the steam is applied after the steam has undergone the expanding process; and whereby a diminution is effected in the weight of the boiler, and in the weight and consumption of water and of fuel."

Remarks by the Editor.

Although the name of Trevithick is one which has attained much just and honourable notoriety in the history of the improvements made in the steam engine, we are apprehensive that the points claimed as new, and relied upon as useful, in the patent above alluded to, will not, upon a fair examination, stand the test of investigation in either particular.

The application of heat to steam after it has been generated in the boiler, has been frequently made, both in England, and in this country. It has been sometimes done by passing flues through the steam chamber, in the upper part of the boiler, and at other times by heating the pipe by which the steam is conveyed from the boiler to the cylinder; so far, however, as we have learned the results, they have been such as to disappoint the anticipations of those who have made the essay; for although by an increase of temperature the elastic force of steam must necessarily be increased, the ratio is such that the advantage gained is but small in amount. We cannot now give the time and space required for a disquisition on this point, nor do we deem it necessary to those acquainted with the subject, as, to such, we should have but little to offer which could be considered as new. The density of steam is an important element in its mechanical effect, and although by heating it after it has been generated, what has been denominated *surcharged steam*, is produced, its density is not thereby increased, this requiring more water as well as more heat.

As regards the mode of propelling a vessel "by the force of the recoil produced from water received with a moderate degree of velocity in the direction of the course of the vessel, and ejected with great velocity in a direction opposite to that course," we had scarcely imagined that a thing which had so repeatedly been essayed, and as frequently proved an abortion, would now be proposed by any one out of his novitiate, especially since the publication of the experiments which prove that water experiences no sensible resistance in its discharge from an orifice submersed in the same fluid.

Patent granted to DANIEL HORTON *and* GEORGE HORTON, *Iron Masters, for an improved Puddling Furnace, for the better production of manufactured iron, in the process of obtaining it from the pig.—Dated September 7*, 1832.

These gentlemen have found that pig iron, having undergone the action of the refining furnace, requires a degree of heat for its re-fusion—in the process of puddling—so great, that the materials of which this latter furnace is composed, are very speedily destroyed or rendered useless. They conceive that the refining furnace may be altogether dispensed with; and they suggest a process whereby the puddling may be conducted on a more economical and equally efficient plan.

Their improvement is extremely simple in its principle. It is the excessive heat which destroys the furnace; therefore their object is to disperse and carry off as much as possible of this heat from the furnace, without in the least lowering the temperature to which the iron must be submitted in the operation of puddling. Where it is possible to expose the whole external surface of the puddling furnace to the action of the atmosphere, its sides may be composed of plates of iron, fitly prepared; and the stream of atmospheric air will carry off a sufficient quantity of the heat to prevent the consumption of the material of the furnace.

Whenever such exposure is impossible, the patentees should surround their furnace with a series of pipes, so constructed as to serve as bridges for the furnace; and these pipes should be made to circulate rapidly a strong force of water, perpetually supplied, and regularly carried off as it becomes heated. Of course other means might be suggested; any good conductor of heat may be applied to the surface of the furnace, and the superfluous caloric may be carried off by radiation or otherwise.

They commence their process by throwing on to the bars of the furnace, a quantity of the slag, ore, or scoria, of the smelting furnace; and when that is in a state of fusion, they throw in the pig iron without its having undergone the usual operation of refining. When it is melted, the heat is increased until the iron boils; and the puddler works it until the slag or earthy matter is all carried away, and the iron remains pure: it is then ready for the forge hammers, or other proofs of its malleability.

The patentees claim as their invention only the carrying off some portion of the heat from the exterior of the furnace itself, and that by means of atmospheric exposure, or aqueductory pipes.

[*Rep. Pat. Inv.*

¶ List of French Patents.

A List of Patents for Inventions, Improvements, and the introduction of Foreign Inventions or Improvements, granted in France during the second quarter of the year 1832.*

(Continued from p. 37.

[TRANSLATED FOR THIS JOURNAL.†]

J. Jul. Josselin, lace maker, Paris, April 13th, (5 years.) New corset trimmings, with or without clasps, by the use of which corsets may be instantaneously unlaced. (P. Improv.)

F. J. C. Klein, from Strasburg, residing at Paris, June 10th, (15 years.) A new means to insure safety, applicable to all sorts of carriages. (P. Invent. Improv.)

J. J. Laborde, teacher at Bordeaux, June 30th, (15 years.) Preparation of a hard and transparent substance, which he calls a *new diaphanous and everlasting paper*, intended to be used for all sorts of writings and drawings. (P. Invent.)

A. Lioret, jr., Paris, June 30th, (5 years.) A carriage for the transportation of firewood. (P. Invent.)

Mathieu de Dombasle, Roville, (Department of Meurthe,) May 19th, (15 years.) Apparatus for pursuing what he calls a process for decoction, for extracting sugar from beets. (P. Invent.)

James Milligan, England, represented at Paris by Mr. Truffault, June 5th, (15 years.) Processes for purifying and refining raw sugar, and other substances. (P. Invent. Improv. Import.)

A. M. Noverre, Paris, April 2nd, (10 years.) A machine for manufacturing bread and biscuit dough. (P. Invent. Improv.)

H. Pape, piano manufacturer, Paris, April 8th, (10 years.) A new application of a sounding board, &c. to different kinds of pianos. (P. Improv.)

A. Perpignan, Paris, May 30th, (5 years.) An improved machine by which a single workman can keep in motion two weaving looms. (P. Import.)

Rabaud, Brothers, & Co. of Marseilles, June 18th, (10 years.) A machine by them called *screw-ways*, for raising ships from the water. (P. Import.)

J. F. Renaud, dyer, Lyons, April 27th, (5 years.) Improved processes for dying various stuffs. (P. Improv.)

Richefeu and Fleschelle, bakers, Paris, May 19th, (15 years.) A machine for mixing dough. (P. Improv.)

* In the following list P. Invent. denotes a patent for an invention. P. Invent. and Improv. a patent for invention and improvement. P. Improv. a patent for an improvement. P. Import. a patent for the importation, or introduction of a foreign invention. P. Import. Improv. a patent for introduction and improvements. P. Invent. Import. a patent for invention and importation.

† By request of the Committee on Publications.

J. A. Robert, medical student, Paris, April 27th, (15 years.) A kind of fire arms, loaded at the breech, and cocked by the motion of raising it. (P. Invent. Improv.)

J. B. Rockelines, captain of artillery, and P. Servel, coachmaker, Montpellier, June 30th, (5 years.) A carriage which cannot be overset. (P. Invent.)

J. Salichon, engineer, Paris, June 27th (15 years.) A new system of navigation. (P. Import. Improv.)

A. D. Sisco, locksmith, Paris, April 13th, (5 years.) An instrument called a *setting spring box*, containing all the tools necessary for taking to pieces and putting together fire arms. (P. Improv.)

A. J. P. Thilorier, Paris, May 16th, (10 years.) An improved machine to compress gas. (P. Invent.)

A. E. Tromfrette, Paris, May 7th, (10 years.) A new method of hanging gig bodies. (P. Invent.)

Virbent, brothers, Toulouse, June 18th, (10 years.) A new method of making bricks, cut by mechanical processes. (P. Invent.)

J. M. Vouret, architect and artist of Louviers, residing at Paris, June 30th, (10 years.) A machine by him called a *moving fuller*, adapted to fulling and felting. (P. Invent.)

J. Wall, tinman, and De Laveloye, engineer, Paris, April 8th, (10 years.) A lamp, called a *chemical lamp*, keeping a constant level, &c. (P. Improv.)

Recapitulation.—In the second quarter of 1832, have been granted in France 53 patents.

TRANSLATIONS.

Polytechnic Society of Paris.

The editor has received from M. De Moleon, of Paris, the subjoined prospectus of the intentions of this Society, and it will afford him sincere pleasure to be made the medium of communication between this institution and any of his fellow citizens. His public situation in the department of State affords him facilities for transmitting to Paris papers or other articles if delivered to him free of expense, in the city of Washington, or left in the charge of the Actuary of the Franklin Institute in Philadelphia.

Not many years have elapsed since our country was dependent upon Europe for almost every thing which was new either in science or the arts, but in this particular a rapid revolution has been effected, and we have now much of our own to offer in exchange for the information which we derive from the old world; and the principle both of national and individual honour urges us to be on the alert in cementing those ties by which the friends of literature and science all over the world are united, and form one great republic, whose united aim is the attainment of the highest intellectual, moral, and physical good.

"Polytechnic Society.—This society has been established by

the former pupils of the polytechnic school, all of whom are conversant with the useful arts, and with commerce.

The object of the society is to promote the progress of the useful arts, and to supply the wants of the manufacturing, commercial and agricultural classes, more especially in France. Its principle means are—

1. An extensive correspondence with its members at home and abroad.

2. A capability, in consequence of an understanding with the heads of establishments, of seeing all orders faithfully executed.

3. A large collection of very perfect models of machines to serve as specimens, and to be exhibited at a particular place.

4. The *Receuil Industriel, &c.* of M. De Moleon; a valuable and interesting journal, which is the vehicle of all the observations and discoveries of the society, and of the results of the communications of its members in every part of the world.

In its organization are included—

1. The class of manufacturers, who attend to the interests of manufacturers, machinists, &c.

2. The class of manufacturers, who watch over rural economy.

3. The class of commercialists, whose vigilance is directed to commerce and its various dependant interests.

Foreign ambassadors are invited to supply the wants of their respective countries through the agency of this society; they will address '*Au directeur de la Société Polytechnique, Rue neuve-des-Capucines, No.* 13 *bis.*'"

M. De Moleon, in a letter to the Editor, says that, "The design of this society is to supply the wants of the productive classes in all countries; to obtain for the use of manufacturers, mechanics, agriculturalits, and artists, the machines which may be useful to them, either in the form of models, or of operating instruments; to attend to their completion, and the transmission of them wherever they may be required; to furnish to those engaged in commerce, such documents, and other aids as may contribute to its prosperity."

Conditions of a Prize proposed by the class of the Mathematical and Physical Sciences, of the Imperial Academy of Sciences of St. Petersburgh, at their sitting on the 10*th of January*, 1833.

"The experiments of Gay Lussac and Thénard, on the manner in which potassium acts in ammonaical gas, has made us acquainted with a peculiar compound to which those philosophers gave the name of *azoture ammonaical du potassium.* Although this name is expressive of a particular mode of combination, the experiments of the French chemists have not sufficed to determine with sufficient precision the elementary composition of this substance, besides which the repetition of these experiments by Sir H. Davy have been attended with different results. It is required, therefore, that the composition of the *azoture ammonaical du potassium* should be ascertained with

all the precision which the present state of science admits. These new experiments should be preceded by a review of those of Gay Lussac and Thénard, and those also of Sir H. Davy. Regard should be had likewise to what is said upon this subject in vol. ii. of the French edition of Berzelius' Treatise on Chemistry.

"The author of a memoir competing for the prize, will, after having determined with precision the elementary composition of the substance in question, endeavour to establish from his experiments what he deems the most probable mode in which the combination takes place, so as properly to designate the nature of the substance analyzed.

"Essays for this prize may be written either in the Russian, German, French, or Latin languages, and addressed by their authors, anonymously, to the perpetual secretary of the academy, prior to the 1st of August, 1834. The prize of 1000 Holland ducats, will be awarded at the public sitting which will be held on the 29th of December of the same year. The essay which obtains the prize will be printed at the expense of the Academy."

The foregoing proposal was transmitted by the St. Petersburgh Academy to the American Philosophical Society, and has been furnished for publication in this Journal.

Thoughts on the Casting of Statues in Metal. *By* John Robison, Esq. Sec. F. R. S. E.

When we consider, in a superficial manner, the comparatively small number of ancient bronze statues which have reached to our times; or read the animated, though somewhat ludicrous, account given by Benvenuto Cellini, of the obstacles he encountered in casting the statues of Perseus;* and when we advert to the large sums required in the present day for casting works of art in bronze, we are at first apt to imagine that the great cost of such works must be the consequence of some mysterious difficulty in the process; but if we go on to examine more closely into the grounds on which this opinion is founded, we begin to perceive the anomaly of any such difficulty being supposed to exist in this country, where immense works have been executed in cast metal, works requiring a rigid accuracy of ultimate dimensions not at all necessary in statuary, in which, if the relative proportions be truly kept, no injurious effect is produced by the shrinking of the metal which takes place in cooling.†

On farther consideration, we are compelled to admit, that where skilful founders and capacious furnaces abound in every district,

* Cellini's difficulties must have arisen from want of power in his furnace, as he says he overcame them by debasing his bronze with pewter, and by getting some well-dried firewood from a neighbour.

† The casting of a cylinder for a steam engine of 200 horses' power, is a more delicate operation than that of a group of statuary; an air hole or flaw, which might be imperceptible, is easily repaired in the statue, would be fatal to the other, though it might not be discovered until great expense had been incurred in finishing it.

where the most intricate castings are daily and hourly made in masses varying in weight from a few grains to many tons, the difficulty, *if any really exist*, should not be sought for in the moulding pit of the founder.

The question then comes to be asked, What is the reason that we see so few great statues in metal, and why are modern ones so costly in their execution? We apprehend the true reply is that bronze, the material usually employed in statuary, is dear; and, that as casting in bronze is not a common operation, furnaces have to be erected, and workmen collected, at a great expense for each separate occasion.

If it be allowed that these are the principal causes of the comparative rarity, and of the great cost of bronze statuary, it is surely worth inquiring, whether, by employing cast iron instead of bronze, we may not materially diminish the cost; and whether, if, in making this substitution, there be any thing likely to arise to counterbalance the advantage which we should gain from the great saving of expense.

In employing iron as the material instead of bronze, we should make a double profit, first, from the cost of the one metal being about a twentieth part of that of the other: and, secondly, from the circumstance, that, in the immediate vicinity of most places where such castings would be required, founderies would be ready with numerous workmen fully competent to undertake more difficult tasks than would have baffled Cellini with the aid of the driest firewood which Florence could have furnished him.*

One component part of the price of an original statue still remains to be adverted to. We mean the remuneration to the artist who designs the model, and superintends the moulding. This, every lover of the fine arts would wish to be liberal; but when the aggregate expense is unnecessarily great, and when the sculptor is forced to assume the (to him) foreign employment of a brass founder, he may often be obliged to sacrifice a portion of what he would be entitled to expect as the reward of his talent, or the recompense for the risk and anxiety he is made to undergo.

If, by adopting a cheaper material, and a less expensive method of casting, we should succeed in greatly reducing the cost of statuary, we could more easily afford a liberal remuneration to the genius of the sculptor, the natural consequences of which would be, that more talent would be called forth, and the public places of our cities would soon be enriched by numerous works of art: perhaps we should by degrees come to vie even with those countries whose more favourable climates have led to a greater development of talent in this branch of the arts, than we have hitherto been able to boast of manifesting.

It will perhaps be objected by some persons, that iron is too mean

* Where fuel is scarce, and of inferior quality, artists will necessarily prefer that metal of which they can accomplish the fusion. If the Greeks or Romans had possessed pitcoal and iron, they would probably have used them in their founderies; having only wood, they used bronze. The Dutch, who have turf for fuel, make statues of lead, while the Belgians having coal mines are now making them of iron.

a material to be used in the higher classes of statuary, but we apprehend that this is a prejudice which will yield on a little reflection. We do not think iron is too mean to form the main-spring of a chronometer, the sabre blade of a hussar, or the sword hilt of a courtier, in which latter form, we learn from Mr. Babbage, it has increased its original value 973 times.* If fitness for the end be the criterion we are to judge by; and if iron be susceptible of taking a sharper impression from a mould than bronze, (which no one can doubt who examines the Berlin and other similar castings,) we are bound to admit that in this respect at least, it is a better material for doing justice to the model of the artist; we may then proceed to inquire, whether there be any thing in the nature of the metal to be likely to make it less durable than bronze.

In one material point iron statues must have the advantage, as the labour which would be required to overthrow and break up a large figure, would scarcely be repaid by the price obtainable for its fragments; while the experience of ages shows us, that the marketable value of bronze affords an irresistible temptation in times of popular tumult, and that gods and goddeses, when made of that material, are not always immortal.

If danger be apprehended from the liability of the surface of iron to deteriorate by oxidation, we would say, that there is not much difference in this respect between bronze and *cast* iron; and that if the same means be taken to prepare and preserve the surface of an iron statue, as is usual with a bronze one, the weather would make little impression on it. We see around us examples of coarse castings, to the preservation of which little or no attention has been paid, and in which no sensible degradation of the surface has taken place, even in long periods of time: it may therefore be fairly inferred, that by the exercise of a little skill, and of a moderate degree of attention, the external appearance of a grand work of art in iron, may be made pleasing to the eye of taste, and may be preserved uninjured for generations.

If we be not greatly mistaken in the effects which must flow from the late improvements in the smelting of iron ore, which have been introduced in some of the furnaces on the Clyde, cast iron of the finest quality for such purposes, will soon be so cheap that we shall see it largely employed for architectural decoration. We should take advantage, therefore, of the means which nature and art have so liberally bestowed on us; and we should strive to make Britain as distinguished for her display of the fine arts, as she has hitherto been for her success in the mechanical ones. [*Edin. Jour. Science.*

* Many of those beautiful miniature statues in French clocks, which we consider as bronzes dorés, are, in point of fact, made of cast iron; but as the gold cannot be applied by amalgamation, as in the case of bronze, the iron ornament may be detected by the inferior appearance of the gilding.

Remarks on Friction, and the Resistance of Moving Bodies.

When Mr. Grahame's experiments on the results of drawing boats on canals at high velocities were first made known, between two and three years ago, they excited some surprise, for they seemed at first to overthrow the established doctrine, of the resistance to the motion of a boat increasing as the squares of the velocities. It was then, however conjectured, that the reason of this apparent departure from the law of resistance, was simply that the boat at high velocities is partially lifted out of the water, and becomes, therefore, a boat of *less sectional displacement.**

Mr. M'Neill's late experiments prove this to be the fact; and the apparently wonderful effects of high velocities are now admitted not at all to disturb the received law as to the resistance.

The consideration of these experiments and their results, has led me to consider whether the same principle which operates to cause a boat to rise out of the water when drawn at a high velocity, does not extend much further. It seems to me that the natural result of very high velocities of a moving body, on any surface, or in any medium, will be, that the body will be *partially lifted up* from its contact with the medium or surface which supports it, and so meet a less number of *resisting particles*.

It has been observed by several engineers (though no accurate experiments have been made,) that the carriages drawn on a rail-way move actually with *less friction* at very high velocities, (say twenty miles per hour,) than at low or moderate ones, (say seven miles per hour.†)

Now this effect could not take place except by the rails being relieved of part of the load or pressure of the carriage; in other words, by the carriages being *partially lifted up* from *contact* with the rails. I do not mean, of course, that they *do not touch*, but they *touch less;* the rims of the wheels do not bite into the rails so much.

So on a common road, if a carriage be drawn very fast, it will be seen to skim along the surface of the ground. This effect is more sensible when the ground is soft, viz. when it approaches more the condition and properties of a fluid.

But all bodies that are not *perfectly hard*, approach more or less

* See a paper on Mr. Fairbairn's book—London Journal, second series.

† This observation is borne out by the calculations made of the *power exerted by the engines* of a locomotive carriage. These calculations were made on the assumption, that the friction of a carriage on a rail-way is a *constant quantity;* and by computing the number of turns of the wheels per minute (from the number of strokes of the engine, and also by the diameter of the wheels,) and multiplying the motion of the piston of the engine by *the constant resistance* it had to overcome, the power exerted by the engine was computed. It was found to be (by this mode of calculation) greatly beyond what the dimensions of the cylinders, and the consumption of steam, would correspond to. Hence it was inferred, that an erroneous ground of calculation must have been taken, in assuming the friction to be *constant*, and that it really must be *less* at very high velocities than at low ones—which conclusion, being supported by observation of facts, deserves weight.

the condition of a fluid, in so far as this, that whatever body be laid upon them will sink in (perceptibly or imperceptibly) to a certain amount, provided the weight of the body supported be sufficient to cause any friction.

Then, when the body supported, (a carriage, for instance,) is put in motion, or drawn by external force, it must displace, (viz. either actually crush or else depress,) those particles of matter of the supporting body that lie in front of it, and hence resist its motion.

Now the particles of fluids, whether of great or little density, (and in this examination I treat materials apparently hard, as fluids,) require always, according to their density and adhesion, a certain time to yield to force, and to change their position. If we cause a body to move through them, at such a velocity, that the time of its increments of motion is not less than the time that the particles require to be disturbed, then *the depth to which the supported body sinks in the supporting medium*, does not change; and the resistance to the motion of the body is regulated by the number of particles of matter that it has to crush or depress.

But if we increase the velocity of the drawn body up to such a point, that the time of the increments of its motion is less than the time required by the particles of the resisting medium to yield force, then the moving body will be lifted up, and will not displace so great a number of particles of the resisting medium; hence the friction or resistance to the motion of the body will be diminished.

I suppose, in fact, the wheels of a carriage, whether on a common road or on a rail-way, to be *immersed partly* in the material of the road or rails, as a boat is partly immersed in a canal—the difference of condition being in degree and not in kind. And I suppose that at high velocities, the wheels of a carriage are lifted up a certain amount, *so as to displace fewer particles* of the matter composing the road, as a boat is found to be lifted up at high velocities, and so to have a less sectional displacement than at low velocities. If this mode of considering the subject be correct, it will show the reason of the fact said to be observed, respecting the decrease of friction on rail-roads at very high velocities.

Your obedient servant,
T. S.

[*Lond. Jour.*]

Observations on the Deviation of the Compass; with examples of its fatal influence in some melancholy and dreadful shipwrecks. By the Rev. William Scoresby, *F. R. S., &c. Communicated by the Author.*

(Concluded from page 43.)

Of a nature somewhat similar, but vastly more calamitous, was the loss of his Majesty's ships St. George of 98 guns, Defiance of 74 guns, and Hero of 74 guns, in the winter of 1811-12.

The Hero, Captain Newman, with the Grasshopper sloop, Captain Fanshawe, sailed December 18, 1811, from Wingo Sound in the Cattegat, with the Egeria, and the Prince William, armed ship, and a convoy of 120 sail. This vessel, the Hero, instead of standing well to the westward, to compensate for the deviation and the action of a north-westerly wind, steered the direct compass-course for the Downs; and having, in the night of the 23d, separated from most of the convoy, she struck the ground in a heavy squall of wind and sleet, upon the Haak Sand, near the Texel Island. Some of the convoy which kept by her shared the same fate; but the greater part, aware, apparently, of the danger into which they were running, hauled off to the westward and escaped. The Hero, after enduring the violence of the concussions against the ground during the night, was seen in the morning totally dismasted, and lying on her beam ends. She soon went to pieces, and the state of the weather preventing assistance reaching her, all the people, with the exception of eight who were washed on shore, perished with her.—*Naval Chron.* 1812, p. 43.

Though thus stranded on the coast of Holland, the captain, it appears, was so confident of his being sufficiently removed from that shore, that when the ship was found to be in danger, he ordered her to be steered to the S. or S. SE. (a course leading directly upon the sand,) from the supposition that he was upon some shoal on the British coast! Surely a person entrusted with the command of a line-of-battle ship, could not be so ignorant of the common rules of navigation as to fall into such a disaster by a mere blunder, especially when different persons in the ship must have kept a reckoning, and mutually have secured themselves against such a chance of error. There was doubtless a great want of prudence shown by the Commodore, yet I imagine that the deviation which he had, doubtless, neglected to take into the account, had a great share in producing the catastrophe.*

The St. George and Defiance were circumstanced a little differently. The former, under Admiral Reynolds, had been dismasted in the Baltic, but being refitted, and considered capable of performing the passage, she made the attempt accompanied by the Defiance. Unfortunately, they steered a direct compass course, and being overtaken by the same gale under which the Hero suffered, both ships went on shore on the western coast of North Jutland. Of the crew of the Defiance, which went to pieces half an hour after striking, only six men were saved, who got to shore on pieces of the wreck. Eleven

* A Mr. White, of Whitby, who was employed as a pilot on board of one of the transports, being told on the fatal day of the accident that the Commodore had made the signal to steer S.SW., ordered his ship to be hauled up W. SW., observing, in the quaint language of a sailor, "If they stand that way they will all sleep in their shoes before morning." This prediction was awfully fulfilled, whilst Mr. White, by his prudence, escaped. He knew nothing of the local attraction of the compass, but he knew, from experience, that something carried the ship towards the Holland coast. This prudent sailor was afterwards, I understand, called up to the Admiralty to be examined in respect to the cause of the disaster that had occurred.

of the crew of the St. George most providentially escaped in a similar way; "and when the last of them left the ship, on the afternoon of the 25th, the Admiral and Captain were lying dead beside each other on the quarter deck, together with the greater part of the crew. Only about fifty remained alive, whose cries were heard till it was dark. The ensuing night terminated their sufferings."

The number of persons that suffered in these three ships, including the whole of the officers on board, amounted to nearly 2000, being a greater loss of life in British seamen than has occurred in some of the most splendid battles in which our fleets have been engaged.

Under circumstances, I believe, somewhat similar to those of the Hero, was lost the Minotaur of 74 guns, Captain Barret, on the Haak Sands at the mouth of the Texel, on the night of the 22nd of December, 1810. She left Gottenburg on the 15th, in company with the Plantagenet and the Loire, with sixty sail of ships under convoy, in tempestuous weather. During the gale she separated from the ships in company, most of which, if not all, made their escape. One hundred and ten of the crew of the Minotaur succeeded in saving themselves in the boats; the remainder, about 360 in number, perished.

Towards the production of all these dreadful calamities, the *deviation of the compass*, I am persuaded, greatly contributed. This, by a very little calculation, we shall be able to render extremely probable, if not to prove it. The distance from Bovenbergen, on the north-west coast of Jutland, to Yarmouth Roads, is 330 miles on a true course S. 42° W., or course per compass, (the variation being 25°) S. 67° W. Let the *mean deviation* of a vessel on an east or west course be 5°, a quantity frequently met with and sometimes exceeded, and let the points of change be north and south, such a vessel, on coming from the Baltic, and steering S. 67° W., or W. SW. nearly, will have $4\frac{1}{2}$° westerly deviation—that is, by the attraction of the vessel the north point of the compass will be drawn towards the west $4\frac{1}{2}$°. By this deviation, therefore, if no allowance be made for it, she will be carried, within the limits of the proposed distance, twenty-six miles to the south-eastward of her reckoning. Now it is very evident, from a simple inspection of the chart of the German Ocean and English channel, that had there been an allowance of twenty-six miles made on the courses of the vessels already mentioned as having been lost on the Haak sand, *an allowance which the wind at the time would have amply admitted*, they would have all gone considerably to the westward of every danger, and the two men-of-war, the Hero and Minotaur, and four transports, together with above 1000 men, would have been saved.

As to the other case, (the St. George and Defiance,) I am not sufficiently acquainted with all the circumstances to speak decidedly of the influence of the local attraction. But I think it exceedingly probable, that had their commanders been fully aware of the deceptive influence of this, then little understood, phenomenon, they would at all events have steered a course so much more westwardly as might, by possibility, have preserved them from the catastrophe which ensued.

Various methods have been devised for the discovery and correction of this insidious influence, some of which it may be proper, in conclusion of this article, briefly to describe.

The first regular process employed for the determination of the "deviation" was to take the bearing of a distant object by a compass in the binnacle, whilst the ship was laid at anchor or at moorings, and successively to observe the relative bearings when the ship's head was put on each point of the compass in succession, as she was gradually "swung" round. In this case, the bearings which were found to accord with the correct magnetic meridian, determined the points of change, or those positions of the ship's head in which the compass gave correct indications; and the differences of the bearings in all other positions of the ship's head, indicated the quantity of local attraction on the several courses.

Another method which I adopted in my own practice was still more simple. A compass was secured at the main top-gallant-mast head, where, being remote from all iron, and directly above the attraction of the ship, it was found to give *the correct magnetic position* on every course alike. This was made the standard compass. Comparing, therefore, the course steered by the binnacle compass with that indicated by the standard, which could be done as frequently as requisite in calm weather and smooth sea, the deviation in that particular position of the ship's head was at once determined. Occasionally a whole series of differences was observed, so that the deviation on every course might be known.

A beautiful and philosophical detector of the deviation has for some time been in use in the navy, the invention of Mr. Barlow, in which a plate of iron is temporaneously affixed in proximity to the steering compass, so as exactly to double the influence of the ordinary attraction of the ship; this increase upon the usual deviation affords, if the position of the plate be correct, a measure of the local attraction produced by the iron in the vessel. The discovery of the position of the plate, however, is a matter of more experimental nicety than can be usually expected from the men of any profession as a body; and no provision, that I am aware of, short of a new determination of the position of the plate, can be obtained for such accidental changes of the local attraction as ships in general are liable to on any change of position in their guns or other masses of iron on board. Where, however, the iron in the vessel remains unaltered, both in quantity and position, Mr. Barlow's plate will, unquestionably, be found capable of exhibiting the influence of the local attraction, generally, throughout the globe, not only with useful, but even philosophical accuracy.

Another invention for the same purpose remains only to be noticed, which is, the beautiful apparatus of Lieutenant Colonel Graydon, of the Engineers, denominated by him the "Celestial Compass."

This ingenious instrument, by a beautiful arrangement of graduated arcs and circles, is so adjusted for the latitude of the place and declination of the sun, that a movable arm, bearing a lens for the concentration of the sun's rays to a point at the axis of the instrument, can be made to traverse in an oblique plane exactly coinci-

dent from the eastern to the western horizon, with the plane of the sun's motion. The speck from the rays of the sun, concentrated by passing through the lens, is received upon a small disk of ivory, and made to coincide, by a vertiginous motion of the instrument, with a dot at the centre of the disk. As, however, the speck from the lens, when the instrument is adjusted for latitude and declination, will always fall either above or below the centre of the disk, except when the azimuth of the arm, in reference to the instrument, is the same as that of the sun in reference to the earth, the simple act of placing the instrument so that the speck may fall upon the dot, will, of necessity, put it in the exact meridional position. By comparing, then, the course steered by the binnacle compass with the true meridian pointed out by the celestial compass, the variation and deviation conjointly will, under existing circumstances, be correctly exhibited, as it were, by direct observation; or, which may be of equal importance, the *true* direction of the ship's head will be at once determined. The *apparent time* is likewise given by the horary circle, without calculation or additional trouble. And besides these properties, so useful and important in practical navigation, the celestial compass has other capabilities, such as the determination of the *latitude of the place*, within remarkably small limits, by a single observation; yet, in this case, as in all others in which the instrument is used, every result is independent of the visible horizon.

This instrument, so scientific in principle, and so strikingly satisfactory in its results, especially as regards the determination of the local attraction of ships, will, it is to be hoped, when better known, find general acceptance with nautical men.

[*New Edinburgh Philos. Mag.*

Method of obtaining Cream from Milk. By GEORGE CARTER, *Esq.*

The process of divesting the milk of its component portion of cream, to an extent hitherto unattainable, has been effected by Mr. Carter, and is thus detailed by that gentleman in a paper presented to the Society of Arts.

A peculiar process of extracting cream from milk, by which a superior richness is produced in the cream, has long been known and practised in Devonshire; this produce of the dairies of that county being well known to every one by the name of "clotted," or "clouted cream." As there is no peculiarity in the milk from which this fluid is extracted, it has been frequently a matter of surprise that the process has not been adopted in other parts of the kingdom.

The opportunities, says Mr. Carter, which I possess of making experiments connected with farming, induced me to direct my attention to the produce of the dairy, with a view to increasing the quantity and quality of cream and butter. Having, therefore, made some inquiry into the practice of the Devonshire dairyman, I found, that besides the improved quality of the cream, a larger quantity of butter

was produced by this mode. I therefore adopted their system as the groundwork of my experiment.

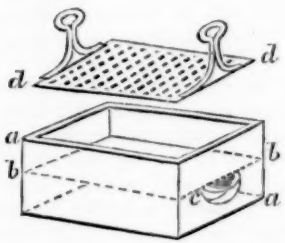
I found, however, that their process is attended with several disadvantages. The mode of applying artificial heat is rude, and the effect uncertain, being entirely dependent on the skill of the dairyman: the result is also perpetually varied by the weather, and other accidental circumstances, over which he has no control.

My first object, therefore, was to construct my apparatus so that its operations should be (as nearly as possible) invariable, confining myself only to that part of the Devonshire process in which heat is applied to aid the separation of the cream from the milk. After a variety of experiments on the temperature applied, the period of its application, and the form and material for the vessels, I obtained the greatest results by adopting the following process:—

A four-sided vessel *a a* is formed of zinc plates twelve inches long, eight inches wide, and six inches deep, with a false bottom, *b b*, at one-half the depth.

The only communication with the lower compartment is by the lip *c*, through which it may be filled or emptied.

Having first placed at the bottom of the upper compartment a plate of perforated zinc *d d*, the area of which is equal to that of the false bottom, a gallon (or any given quantity) of milk is poured (immediately when drawn from the cow) into it, and must remain there at rest for twelve hours; an equal quantity of boiling water must then be poured into the lower compartment through the lip *c*, it is then permitted to stand twelve hours more, (i. e. twenty-four hours altogether,) when the cream will be found perfect, and of such consistence that the whole may be lifted off by the finger and thumb. It is, however, more effectually removed by gently raising the plate of perforated zinc from the bottom by the ringed handles, by which means the whole of the cream is lifted off in a sheet, without remixing any part of it with the milk below.



With this apparatus I have instituted a series of experiments; and, as a mean of twelve successive ones, I obtained the following results:—

Four gallons of milk, treated as above, produced in twenty-four hours, four and a half pints of clotted cream, which, after churning only fifteen minutes, gave forty ounces of butter.

Four gallons of milk, treated in the common mode in earthenware pans, and standing forty-eight hours, produced four pints of cream, which, after churning ninety minutes, gave thirty-six ounces of butter.

The increase in the quantity of cream, therefore, is $12\frac{1}{2}$ per cent., and of butter upwards of 11 per cent.

The advantage, however, is not limited to this increase of quantity, since it appears that in my process ten or fifteen minutes churning is sufficient to produce butter, whilst it requires ninety minutes to produce the same effect with the common cream. The results are also constant; no variety in flavour, colour, or consistency, is observable, although my experiments have been made under circumstances which would have affected all these qualities in the common process.

I am not prepared to declare how much of the advantage of this operation depends on mechanical, and how much on chemical action. It has been long known that the application of artificial heat has facilitated the separation of cream from milk, probably by forming an ascending current in the fluid, as well as disengaging the suspended particles of cream by rendering the whole more liquid. But I have found that the material of which I make my vessels is a very important feature in the process; for the cream is formed in zinc vessels many hours earlier than in earthen ones. I hazard a conjecture, that this is owing to a galvanic effect, which is produced by the lactic and acetic acids (developed in the milk by heat and rest) acting slightly on the zinc plates of the vessel. We have, therefore, two fluids acting on one metal, which is well known to be a galvanic arrangement of the second order. The acids, which would otherwise cause the coagulation of the milk, are thus taken up by the zinc; and the milk by remaining more perfectly fluid admits the easy ascent of the suspended cream. I have ascertained, on analysis, the presence of acetate and lactate of zinc in the skimmed milk, which would, therefore, seem to favour this hypothesis.

I ought to state, that my experiments have been made on land which is not most favourable for the production of butter, it being cold or gravelly; indeed, the whole of the Kentish land is unfit for producing cheese, a certain proof of its inferiority. As, however, my experiments have been comparative, and made with the produce of the same land, so it is reasonable to expect that proportionate advantages will be obtained in all cases, be the land richer or poorer.

I do not claim the merit of originality in this process farther than in the use of the zinc vessel, and the mode in which the heat is applied, by which the results are rendered certain and invariable; neither do I profess to have obtained the maximum of quantity which can be produced by this process. The operation, however, is so simple, and its efficiency so apparent, that it cannot be too generally known.

The experimental farmer will instantly perceive the advantages accruing from its adoption, and probably his attention to the subject may produce greater results. I shall feel richly rewarded if, by exciting an interest on the subject, I can produce any, the slightest, improve-

ment in the quality or mode of producing an article which may properly be deemed one of the necessaries of life.*

[*Trans. Soc. of As.*

¶ *Secrets in Pottery.*

(Concluded from p. 60.)

Blue Printing Bodies—Slip State.

Nos.	1	2	3	4	5	6	7	8	9	10	11	12	13
Blue clay	35	60	35	40	27	56	60	55	57	50	50	66	40
Black do.	15		10	15	11					10	20		10
Brown do.	15		15	10	12								10
China do.	12	20	20	17	25	27	18	22	23	18	10	17	20
Flint	20	20	18	15	25	14	20	20	16	20	19	17	20
Cornwall stone	3		2	3		3	2	3	4	2	1		2
Parts	100												

The clay slips 24 oz. Stone 28 oz. to pint. No. 12 is Mr. Spode's. (For glaze, see blue printing glazes, No. 8.)

Blue Printing Glazes.—Nos. 1 and 2.

Fritt.			Glaze.		
Glass	16	16	Glass	35	35
Red lead	5	4	W. lead	42	28
Arsenic	1	1	Cornwall stone	33	14
Nitre	1	1	Flint	4	3
Blue calx	1½ oz.	1	Fritt	21	20

No. 3. (Meigh's.)

Fritt.	lb.	Or		Glaze.	
Glass	18	Glass	45	Fritt	20
Red lead	2	Pearl ash	3	W. lead	46
Arsenic	1	Blue calx	3½ oz.	Cornwall stone	29
Nitre	1			Flint	5
Blue calx	3 oz.				

No. 4. (Meigh's.)

Fritt.		Or		Or	Glaze.	
Glass	20	Glass	50	50	Fritt	12
Arsenic	1½	Red lead	6	6	W. lead	50
Nitre	1½	Blue calx	7 oz.	7 oz.	Cornwall stone	26
Borax	1				Flint	12

* It appears from Mr. Carter's statement that milk which has been subjected to his process, is more or less impregnated with the soluble salts of zinc. The well known astringency of these salts, and their emetic quality when in a state of moderate concentration, induced the committee to inquire what use is made of the milk after separation of the cream. Mr. Carter replied that it is employed wholly in feeding pigs, and that the health and growth of these animals do not appear to be at all affected thereby.

(No. 5. W. Moor's.)

Fritt.	lbs.	Glaze.	
Glass	20	W. lead	50
W. lead	1½	Cornwall stone	26
Salt	1	Dry flint	12
Arsenic	4 oz.	Fritt	10
B. calx	4 oz.	Borax (calcined)	2

No. 6. (Wilson's.)

Fritt.	lb.			Glaze.	
Glass	24	Fritt in gloss oven, then add	Glass 130	W. lead	49
Lead	5		B. calx 9 oz.	Cornwall stone	24
Arsenic	1		Grind at mill.	Fritt	19
Nitre	2			Flint	8

No. 7. (Spode's.)

Fritt.		Glaze.	
Glass	24	Fritt	12
Flint	6	W. lead	50
Nitre	4	Cornwall stone	24
Borax	1	Flint	6
B. calx	4 oz.	Glass	8

No. 8. (Spode's.)

Fritt.	lb.	Or	lb.	Glaze.		Or lb.
Glass	34	Flint	16	Dry Flint	20	18
Arsenic	2	Nitre	4	Flint	6	5
Nitre	2	Red lead	4	Cornwall stone	30	28
Red lead	10	Borax	8	W. lead	50	49
B. calx	1					

Grind with 100 lbs. glass at mill. A few ounces of nitre melted in each charge before dipping.

No. 9. (Spode's.)

Calcine, pick, pound, and sift Cornwall stone, in 6 saggers.

Fritt—Cornwall stone 60 lbs.
Borax 30
Dry flint 30

in bottom of gloss oven; sufficient for three portions of glaze.

To two saggers add for one glaze,

	lb.	Or
W. lead	340	54
Cornwall stone	160	26
Flint glass	56	10
Dry flint	28	6
Pearl ash	15	3
Sal ammon.	4½	1
		100

No. 10. (J. Yates.)

In two Saggers, washed with flint, put

Cornwall stone	53 lbs.
Salt	2
Borax	2

In one sagger do. put .	Dry flint .	30
	Borax . .	4
Do. half inch thick .	White glass . .	34
	Nitre . .	1
	W. lead . .	4

Fritt in bottom of gloss oven; pick, pound, and sift; grind at mill; stain with 5½ lbs. of stain, (No. 2 of raw glazes, afterwards specified.) Grind well 113 lbs. W. Lead; then add fritt; mix well, and pass through 16 lawn.

No. 11, improvement on No. 10. (J. Clowes.)

Into one sagger put		Into another	
W. glass .	34 lbs.		
W. lead .	4	Dry flint .	30
Salt . .	2	Borax .	6
Nitre .	1		

Pick, pound, and sift through a $\frac{3}{16}$ riddle, mix well, and fritt in gloss oven; then again pick, &c., carefully; and the same with 53 lbs. calcined Cornwall stone; grind at mill; then add 113 lbs. best W. lead, and 5½ lbs. stain, (No. 2 of raw glazes.) In each preparation, 17s. 8d. is saved; and J. Clowes says, this is a much better glaze.

No. 12.

Mix well.		also with		Fritt in gloss oven, and grind with 48 lbs. glass.	Glaze (Blue.)	
Glass .	32 lbs.	Nitre	1 lb.		W. lead	51
Corn. stone	10	Soda	1		Corn. stone	27
W. lead .	4	R. lead	2		Flint .	10
Pearl ash	4	B. calx	2 oz.		Glass .	4
Borax .	4				Fritt .	8

No. 13.

Calcine in gloss oven.		Grind well for use.	Glaze.	
W. Lead .	12 lbs.		Fritt . .	4
Borax . .	6		W. lead .	50
Soda . .	4		Cornwall stone .	28
B. calx . .	4 oz.		Flint . .	12
Then add glass .	60 lbs.		Do. glass .	6

Raw Glazes.—Blue Printing.

No. 1. (Davenport's.)

W. lead	49	Flux without fr iting,	
Cornwall stone .	22	Salt .	14 oz.
Flint .	7	Borax .	12 oz.
Glass .	22=100 parts.		

No. 2. (J. Barlow's.)

W. lead	49		Stain,	W. lead	2	Fritt in top of biscuit oven, then pick, pound, sift and grind.
Composition	24			Nitre	½	
Dry flint	14			Salt	1	
Glass	10			Glass	30	
Stain	3 = 100 parts.			B. calx	10 oz.	
Add dissolved borax	2 ounces.			Borax	1 lb.	

No. 3. (W. Moore's.)

W. Lead	52		Without fritting.		1 oz. blue calx, washed in 4 oz. of salt rock.
Cornwall stone	24		W. lead	51	
Flint	12		Corn. stone	25	
Do. Glass	12 = 100 parts.		Flint	12½	
Blue flux 7 oz.	}		Do. glass	11	
1½ flux to 1 blue.	}		Potash	½ = 100 parts.	

Glazes for Enamel, or Blue Edge.

No. 1.

Grind for 24 hours,	Flint	20	Then dissolve in hot water, and add
	Glass	20	40 oz. borax
	Cornwall stone	60	24 ,, oxide of tin
			8 ,, nitre
			16 ,, salt
			190 lbs. lead.

When sifted, send to mill, and add 3 oz. B. calx before it can settle, else liable to blue spots.

No. 2.

Fritt, in gloss oven, 1 sagger washed	Flint	25 lbs.	Grind with Cornwall stone 57 lbs., and add	
	Borax	3	W. lead .	117 lbs.
1 sagger flinted	Glass	22	Raw glaze stain, No. 2 .	¼
	Salt	1	Or with do. . .	2½ for a
	W. lead	2	very excellent blue edge glaze. The stain	
	Nitre	0½	to be twice ground and sifted.	

No. 3.

Fritt.		Or		Gla	
Glass	50 lbs.	Glass	10 lbs.	Fritt	10
R. lead	2½	R. lead	1	W. lead	50
Bone	50	Arsenic	8 oz.	Cornwall stone	26
Salt	2	Nitre	8 oz.	Flint	4
B. calx	5 oz.	B. calx	3 oz.		

No. 4 and 5.

Glass .	17	6
W. lead .	55	54
Cornwall stone	21	28
Flint .	7	12
B. calx .	1 oz.	1½ oz.

No. 6.

B. Pr. Gl. No. 1 Fritt . .	13
W. lead . .	52
Cornwall stone . .	23
Flint . . .	12=100 parts.
Flow with salt . .	6
Nitre . . .	4

[*Mech. Mag.*

Biscuit Baking Machinery.

We observe with great pleasure in the Navy estimates for the present year a proposition for a grant for £2,000 to T. T. Grant, Esq., store keeper of the Royal Clarence Victualling Establishment, at Weevil near Portsmouth, for the invention of the ingenious biscuit baking machinery recently erected at that establishment. For the following very circumstantial description of this machinery, and statement of the saving effected by it, we are indebted to a recent number of the United Service Journal.

"The first procedure in this biscuit baking operation, consists, you may suppose, in mixing the flour and water together; but I should tell you that, antecedent to that, the establishment has ground the flour in mills, worked by the same machine which gives motion to those parts I am about to describe. Nor is this an immaterial point; for by it all possibility of mixing improper ingredients along with the flour is prevented, and precisely that proportion of the bran which is required in the composition of good biscuit is retained. I ought likewise to have mentioned before, that adjacent to the mills stands a series of four granaries, each capable of holding fifteen hundred quarters,—in all, six thousand quarters. The flour mill is furnished with ten pair of stones, by which forty bushels of flour can be ground and dressed, ready for baking, in an hour. The baking establishment consists of nine ovens, each thirteen feet by eleven, and seventeen inches and a half in height. These are heated by furnaces attached to each, so constructed that a blast of hot air and fire sweeps through them, and gives to the interior the adequate dose of heat in an incredibly short time.

"The commencement of the baking consists in introducing into a trough thirteen gallons and a half of water, and then allowing to enter it a sack of what is technically called biscuit meal flour, weighing 280 pounds. When the whole has been poured in by a channel communicable with an upper room, a bell rings and the trough is closed. A singular apparatus, consisting of two sets of what are called knives,

each ten in number, is made to revolve amongst the flour and water, by means of the machinery. This mixing lasts one minute and a half, during which time the double set of knives or stirrers make twenty-six evolutions. Each batch of the dough thus rudely mixed weighs 388 pounds, and forms eventually two suits and a half of bread, weighing 250 pounds, or, in other words, 1,250 biscuits, each suit, or batch, being 100 pounds in weight. The next process is to cast the lumps of dough under what are called breaking rollers, huge cylinders of iron, weighing 14 cwt. each, and moved horizontally by the machinery along stout tables. The dough is thus formed into large rude masses, six feet long by three broad, and several inches thick. At this stage of the business the kneading is still very imperfect, and some traces of dry flour may still be detected. These great masses of dough are now drawn out, and cut into a number of smaller portions, about a foot and a half long by a foot wide, and again thrust under the rollers. I forget how many times the dough is made to pass under these rollers, but sufficiently often to make the mixture so complete that the slightest trace of inequality is not to be discovered in any part of its substance. I should mention that two workmen stand, one at each side of each roller, and as the dough is flattened out they fold it up, or double one part upon another, so that the roller at its next passage squeezes these parts together, and forces the whole to mix. After this process has been gone through a sufficient length of time, the dough is cut into small portions, and being placed on large flat boards is transported by the sole agency of the machinery, in the most comical manner, from the centre to the extremity of the baking room. Here it is received by a workman, who soon places it under what is called the sheet roller, but it would be better named the blanket roller, for in size and thickness, and nearly in colour, it resembles a blanket. The kneading is thus rendered quite complete, and the dough is in a fit state for the oven, and it only requires to be cut into biscuits. This part of the proceeding is admirably contrived. It is effected by what is called a cutting plate, consisting of a network of fifty-two sharp edged hexagonal frames, each as large as a biscuit. This frame is moved slowly up and down by the machinery, and the workman, watching his opportunity, slides under it the above described blanket of dough, which is about the size of the leaf of a dining table, and in the next instant down comes the cutting frame, indents the sheet, but does not actually cut it through; for enough of the substance is left uncut to enable the workman at the mouth of the oven to jerk the whole mass of fifty-two biscuits unbroken into the oven. It may be asked, how it happens that the dough does not stick to the frame? but this is prevented by a most ingenious device. Besides the cutting portion of each of the two hexagons, there is a small flat open frame, movable up and down, carrying above it a ball of iron several ounces in weight. When the great frame comes down upon the dough, and cuts out the fifty-two biscuits, each of these minor frames yields to the pressure, and all the little iron balls are seen to rise up; but as soon as the great frame rises, the weight of the balls, acting on the little frames over each biscuit, thrusts the whole blanket

off, and allows the workman to pull it out. One quarter of an hour is sufficient to bake the biscuit, which is afterwards placed for three days in a drying room, heated to 85° or 90°, which completes the process.

"The whole nine ovens bake about a ton of bread an hour, or ten thousand biscuits. If, instead of nine, there were twelve ovens, it has been calculated that 70,000 cwt. of bread might be baked in a year. Now it appears that the average quantity issued from Depford, Portsmouth, and Plymouth, during the last five years, was 68,000 cwt.; consequently, if this branch of the Royal Clarence Victualling Establishment were increased by only three ovens (and no further machinery,) all the biscuit required by the navy might be prepared by the admirable process on one spot. The relative cost of making the above quantity of bread by hand, or by the machinery actually erected and in operation, I have taken some pains to ascertain—

Cost by machinery, . . .	£1,560
Ditto by hand, ...	5,260
Saving in the wages of labour. . .	£3,700

"From this saving there must, of course, be deducted a portion of the interest of the money laid out in the machinery. I say a portion of the interest, because the same steam engine which moves the baking apparatus, turns ten pairs of mill stones, and pumps up water for the supply of his majesty's ships, and it is only a small part of the power which must be kept in action at any rate, that is directed to these baking purposes. When, however, the large engine is not required to grind flour, or to pump up water, a small ten horse engine is set in motion, if it be required, to bake bread.

"The foregoing calculation of what twelve ovens could perform, is an estimate. The following statement is derived from actual experiment:—

"In 116 days, during 68 of which the work was continued for seven and a half hours, and 48 for five and three-fourths hours only, in all 769 actual working hours, equal to 77 days, at ten hours each day, the following quantity of bread was baked in nine ovens, at the Royal Clarence establishment—12,307 cwt. of biscuit, which is equal to 1,378,400 pounds.

The wages of the men employed in baking this quantity of bread, amounted to . .	£273	10	9½
If it had been made by hand, the wages of the men employed would have been . .	933	5	10
Saving in the wages of labour, . .	£659	7	0½

"In this, I may repeat, is not included any part of the interest of the sum laid out on the machine, or spent in keeping it in order. But in a very few years, at such an immense rate of saving, the cost of the engine and other machinery would be repaid.

"The machinery bread, though at first objected to by many per-

sons, has become universally popular in the navy. It is better, decidedly, than any which has heretofore been supplied to his majesty's ships, and it promises to keep better. Formerly the sailors very rarely, if ever, took up the whole of their allowance of bread; but since the machinery biscuit has been issued, it seldom occurs that a single pound is left behind. If the intention of stowing it in iron tanks be followed up, the fresh quality may be preserved for any length of time, and the 'remainder biscuit' after a voyage cease to be a proverb redolent of weavils, mouldiness, and dust."

[*Mech. Mag.*

Steam Carriages.

The London and Paddington Steam Carriage Company have tried and proved the effectiveness of their carriage, by taking it from Paddington to Londonwall, and thence up Houndsditch, through Whitechapel, (on market day,) and on to Stratford and West Ham, and returning the same way back again; thus proving its capability of proceeding through crowded thoroughfares without inconvenience or liability to accident to the persons in the carriage, or others. We have also on Monday begun to ply to and from Paddington to the city for hire; and intend, for the present, continuing to go once or twice a day for the purpose of developing the wants of the road, and also such imperfections as may appear in practice, in order that we may remedy them in the other carriages in progress of preparation. As soon as we have got two more carriages ready, the whole three will commence running in regular succession on this line of road, each carriage performing fourteen journeys to and fro per day, which is nearly the work of three omnibusses and thirty horses. During the early journeys of this single carriage the fare will be one shilling. We do not, however, wish people to think we have commenced business as we mean to go on; for, at present, we are really only going for the purpose of satisfying the public of the safety and perfect practicability of this mode of travelling, and also of getting practice on the road, so that we may find out and apply every improvement that may be requisite. When the novelty of the thing has worn off a little, it is to be hoped that the road will not be so crowded with curious gazers as it is now every time we go out, to the great prejudice of the speed of the vehicle, which it requires no small portion of skill and care on the part of the guide to steer with safety, through the multitude of coaches, gigs, carts, drays, &c. that constantly beset its path. As it is, a second journey each day would, *at present*, become a perfect nuisance; but as soon as the road, by our frequent journeys, becomes less crowded, we shall, even with the one carriage, go two or three journeys occasionally, perhaps more, as soon as we are satisfied that we have adopted every improvement in strength and quality that daily practice may show to be necessary. The carriage has been open to public inspection on these premises for nearly three months; but, now that we go out daily, strangers are not admitted on any account, as it would interfere too much with the regular business of the establishment, and also with the progress of the other carriages. [*Ibid.*

Preserving Fruit without Sugar.

Sir,—In the year 1808, (twenty-five years ago,) I received a premium from the Society of Arts for a method of preserving fruit without sugar, the particulars of which was published in the twenty-sixth volume of their Transactions; but as their publications seldom extend beyond the subscribing members, I have made some extracts from the method laid down, for the purpose of a more extended public benefit, by submitting them to the readers of your magazine.

From the experience I have had in bottling fruits in the manner laid down, I have no doubt but they will keep perfectly good for many centuries, as the Society have in their museum some of the samples of fruit twenty-six years old, and I have some gooseberries by me twenty-five years old, and which appear to be as perfect and good as they were before they were bottled.

Thomas Saddington.

Process for preserving Fruit.

The bottles I chiefly use for small fruit, such as gooseberries, currents, cherries, and rapsberries, are selected from the widest necked of those used for wine or porter. Having got them properly cleaned and the fruit ready picked, (which should not be too ripe,) fill such of them as you intend doing at one time as full as they will hold, so as to admit the cork going in, frequently shaking the fruit down whilst filling; when done fit the corks to each bottle, and stick them lightly in, so as to be easily taken out when the fruit is sufficiently scalded, which may be done either in a copper or large kettle, over the fire, first putting a coarse cloth of any sort at the bottom to prevent the heat of the fire from cracking the bottles: then fill the copper or kettle with cold water sufficiently high for the bottles to be nearly up to the top of the neck in it; put them in sideways to expel the air contained in the cavity under the bottom of the bottle; then light the fire if the copper is used, taking care that the bottles do not touch the bottom or sides, which would endanger their bursting, and increase the heat gradually until it comes to about 160 or 170 degrees by a brewing thermometer, which generally requires about three quarters of an hour. For want of such an instrument it may be very well managed by judging of the degree of heat by the finger, which may be known by the water feeling very hot, but not so as to scald it. When it arrives at a sufficient degree of heat, it must be kept at the same for about half an hour longer, which will at all times be quite enough. During the time the bottles are increasing in heat, a tea-kettle full of water must be got ready to boil; as soon as the fruit is properly scalded, take the bottles out of the water one at a time, and fill them within an inch of the cork, with the boiling water out of the tea-kettle. Cork them down immediately, doing it gently, but very tight, by squeezing the cork in; tie the cork down, and lay the bottles on their sides, as by that means the cork keeps swelled, always observing to let them lie on their sides until wanted for use. During the first

month or two after they are bottled, it will be necessary to turn the bottles a little round once or twice in a week, to prevent the fermentation that will arise on some fruits from forming into a crust, by which proper attention the fruit will be kept moist with the water, and no mould will take place. It will also be proper to turn the bottles a little round, occasionally, afterwards. This manner of preserving fruit will be found particularly useful on shipboard for sea stores, as the fruit is not likely to be injured by the motion of the ship when the bottles are laid down on their sides, and the corks kept moist by the liquor, but on the contrary will keep well even in hot climates.

The following sorts of fruit, as samples, were sent for examination, and approved of by the Society of Arts, viz. apricots, rhubarb (peeled and cut into square pieces,) gooseberries, currants, raspberries, cherries, plums, Orleans plums, egg plums, damsons, Siberian crabs, and green gages. [*Ibid.*

Expeditious method of dissolving Amber and Copal.

Sir,—After numerous trials I have at length succeeded in making a saturated solution of amber and copal in spirits of wine and oil of turpentine, without the addition of any foreign substances. I have tried the methods described by Tingry, Varley, &c., but with common turpentine they will not succeed. Tingry's requires no less a period that six months. The plan I pursue is as follows—take a piece of glass tube about four inches long, one-half inch in diameter, and one-tenth inch thick; close up one end and then introduce a few small pieces of amber or copal, and fill the tube about half full of alcohol, specific gravity ·790 (I have not tried a weaker spirit;) close now the upper end with the blow-pipe, and hold it, by means of a wire twisted round it, over a clear fire. The spirit will presently disappear, and the tube be filled with a dense vapour; it may then be removed from the fire, when the vapours will be seen to condense all at once into a colourless fluid, which will turn yellow as it cools. When copal is operated upon it appears quite opaque when the tube is full of vapour, but recovers its transparency as it cools. When the tubes are opened there is no escape of elastic fluid, and if the solutions are poured on a plate of warm glass they will flow into beautiful transparent varnishes. The amber will, no doubt, form an excellent varnish for electrical purposes. When oil of turpentine is used, it appears to expand so as nearly to fill the tube; when poured out it was nearly colourless, and dried almost as fast as spirit varnish. I need scarcely add, that the hand should be protected by a glove, and the face with a plate of glass, or a board with a hole in the centre. To make varnish in the large way, a Papin's digester should be used, and the heat may be regulated by laying the amber, or copal, on the cover; when they melt, the heat may be judged high enough, as copal applied to the outside of the tube readily melted after it had been removed from the fire some time.

G. Dakin.

[*Ibid.*

¶ POPULAR SCIENCE.

No. V.

On the Colours of Fibres and Grooved Surfaces.

When we look at a candle, or any other luminous body, through a plate of glass covered with vapour or with dust in a finely divided state, it is surrounded with a corona or ring of colours, like a halo round the sun or moon. These rings increase as the size of the particles which produce them is diminished; and their brilliancy and number depend on the uniform size of these particles. Minute fibres, such as those of silk and wool, produce the same series of rings, which increase as the diameter of the fibres is less; and hence Dr. Young proposed an instrument called an *eriometer*, for measuring the diameters of minute particles and fibres, by ascertaining the diameter of any one of the series of rings which they produce.

By observing the colours produced by reflexion from the fibres which compose the crystalline lenses of the eyes of fishes and other animals, I have been able to trace these fibres to their origin, and to determine the number of poles or septa to which they are related. The same mode of observation, and the measurement of the distance of the first coloured image from the white image, has enabled me to determine the diameters of the fibres, and to prove that they all taper like needles, diminishing gradually from the equator to the poles of the lens, so as to allow them to pack into a spherical superficies as they converge to their poles or points of origin. These coloured images, produced by the fibres of the lens, lie in a line perpendicular to the direction of the fibres, and by taking an impression on wax from an indurated lens, the colours are communicated to the wax. In several lenses I observed coloured images at a great distance from the common image, but lying in a direction coincident with that of the fibres; and from this I inferred, that the fibres were crossed by joints or lines, whose distance were so small as the 11,000th part of an inch; and I have lately found, by the use of very powerful microscopes, that each fibre has in this case teeth like those of a rack, of extreme minuteness, the colours being produced by the lines which form the sides of each tooth.

In the same class of phenomena we must rank the principal colours of mother-of-pearl. This substance, obtained from the shell of the pearl oyster, has been long employed in the arts, and the fine play of itscolours is therefore well known. In order to observe its colours, take a plate of regularly formed mother-of-pearl, with its surfaces nearly parallel, and grind these surfaces upon a hone or upon a plate of glass, with the powder of schistus, till the image of a candle reflected from the surfaces is of a dull reddish-white colour. If we now place the eye near the plate, and look at this reflected image, C, we shall see on one side of it a prismatic image, A, glowing with all the colours of the rainbow, and forming, indeed a spectrum of the candle as distinct as if it had been formed by an equilateral prism of flint glass. The blue side of this image is next the image C.

On the outside of the image A there is invariably seen a mass, M, of coloured light, whose distance MC is nearly double AC. These three images are always nearly in a straight line, but the angular distance of M varies with the angle of incidence according to a law different from that of A. At great angles of incidence the nebulous mass is of a beautiful crimson colour; at an angle of about 37° it becomes green; and nearer the perpendicular it becomes yellowish white, and very luminous.

If we now polish the surface of the mother-of-pearl, the ordinary image C will become brighter and quite white, but a *second prismatic image*, B, *will start up on the other side of* C, *and at the same distance from it.*

This second image has in all other respects the same properties as the first. Its brightness increases with the polish of the surface, till it is nearly equal to that of A, the lustre of which is slightly impaired by polishing. This second image is never accompanied, like the first, with a nebulous mass M. If we remove the polish, the image B vanishes, and A resumes its brilliancy. The lustre of the nebulous mass M, is improved by polishing.

If we repeat these experiments on the *opposite* side of the specimen, the very same phenomena will be observed, with this difference only, that the images A and M are on the opposite side of C.

In looking through the mother-of-pearl when ground extremely thin, nearly the same phenomena will be observed. The colours and distances of the images are the same, but the nebulous mass, M, is never seen by transmission. When the second image, B, is invisible by reflexion, it is exceedingly bright when seen by transmission, and vice versa.

In making these experiments I had occasion to fix the mother-of-pearl to a goniometer with a cement of rosin and beeswax; and upon removing it I was surprised to see the whole surface of the wax shining with the prismatic colours of the mother-of-pearl. I at first thought that a small film of the substance had been left upon the wax, but this was soon found to be a mistake, and it became manifest that the mother-of-pearl really impressed upon the cement its own power of producing the coloured spectra. When the unpolished mother-of-pearl was impressed on the wax, the wax gave only one image, A; and when the polished surface was used, it gave both A and B, but the nebulous image M was never exhibited by the wax. The images seen in the wax are always on the opposite side of C, from what they are in the surface that is impressed upon it.

The colours of mother-of-pearl, as communicated to a soft surface, may be best seen by using black wax; but I have transferred them

also to balsam of Tolu, realgar, fusible metal, and to clean surfaces of lead and tin by hard pressure, or the blow of a hammer. A solution of gum arabic or of isinglass, when allowed to indurate upon a surface of mother-of-pearl, takes a most perfect impression from it, and exhibits all the communicable colours in the finest manner, when seen either by reflexion or transmission. By placing the isinglass between two finely polished surfaces of good specimens of mother-of-pearl, we shall obtain a film of artificial mother-of-pearl, which when seen by single lights, such as that of a candle, or by an aperture in the window, will shine with the brightest hues.

If, in this experiment, we could make the grooves of the one surface of mother-of-pearl exactly parallel to the grooves in the other, as in the shell itself, the images, A and B, formed by each surface would coincide, and only two would be observed by transmission and reflexion: but as this cannot be done, *four images* are seen through the isinglass film, and also four by reflexion; the two new ones being formed by reflection from the second surface of the film.

From these experiments it is obvious that the colours under our consideration are produced by a particular configuration of surface, which, like a seal, can convey a reverse impression of itself to any substance capable of receiving it. By examining this surface with microscopes, I discovered in almost every specimen a grooved structure, like the delicate texture of the skin at the top of an infant's finger, or like the section of the annual growths of wood, as seen upon a dressed plank of fir. These may sometimes be seen by the naked eye, but they are often so minute that 3000 of them are contained in an inch. The direction of the grooves is always at right angles to the line MACB, fig. 62; and hence in irregularly formed mother-of-pearl where the grooves are often circular, and having every possible direction, the coloured images A B are irregularly scattered round the common image C. If the grooves were, accordingly, circular, the series of prismatic images A B, would form a prismatic ring round C, provided the grooves retained the same distance. The general distance of the grooves is from the 200th to the 5000th of an inch, and the distance of the prismatic images from C increases as the grooves become closer.

These grooves are obviously the sections of all the concentric strata of the shell. When we use the actual surface of any stratum, none of the colours A B are seen, and we observe only the mass of nebulous light M occupying the place of the principal image C. Hence we see the reason why the *pearl* gives none of the images A B, why it communicates none of its colours to wax, and why it shines with that delicate white light which gives it all its value. The pearl is formed of concentric spherical strata, round a central nucleus, which Sir Everard Home conceives to be one of the ova of the fish. None of the edges of its strata are visible, and as the strata have parallel surfaces, the mass of light M is reflected exactly like the image C, and occupies its place; whereas, in the mother-of-pearl it is reflected from surfaces of the strata, inclined to the general surface of the specimen which reflects the image C. The mixture of all these diffused

masses of nebulous light, of a pink and green hue, constitutes the beautiful white of the pearls. In bad pearls, where the colours are too blue or too pink, one or other of these colours has predominated. If we make an oblique section of a pearl, so as to exhibit a sufficient number of concentric strata, with their edges tolerably close, we should observe all the communicable colours of mother-of-pearl.*

These phenomena may be observed in many other shells besides that of the pearl oyster; and in every case we may distinguish communicable from incommunicable colours, by placing a film of fluid or cement between the surface and a plate of glass. The communicable colours will all disappear from the filling up of the grooves, and the incommunicable colours will be rendered more brilliant.

The principle of the production of colour by grooved surfaces, and of the communicability of these colours, by pressure, to various substances, has been happily applied to the arts by John Barton, Esq. By means of a delicate engine, operated by a screw of the most accurate workmanship, he has succeeded in cutting grooves upon steel at the distance of from 2000th to the 10,000th of an inch. These lines are cut with the point of a diamond, and such is their perfect parallelism and the uniformity of their distance, that while in mother-of-pearl we see only one prismatic image, A, on each side of the common image C, of the candle, in the grooved steel surfaces six, seven, or eight prismatic images are seen, consisting of spectra as perfect as those produced by the finest prisms. Nothing in nature or in art can surpass this brilliant display of colours; and Mr. Barton conceived the idea of forming buttons for gentlemen's dress, and articles of female ornament covered with grooves, beautifully arranged in patterns, and shining in the light of candles or lamps with all the hues of the spectrum. To these he gave the appropriate name of *Iris* ornaments. In forming the buttons the patterns were drawn on steel dies, and these, when duly hardened, were used to stamp their impressions upon polished buttons of brass. In day-light the colours on these buttons are not easily distinguished, unless when the surface reflects the margin of a dark object seen against a light one; but in the light of the sun, and that of gas flame or candles, these colours are scarcely, if at all, surpassed by the brilliant flashes of the diamond.

The grooves thus made upon steel are, of course, all transferable to wax, isinglass, tin, lead, and other substances; and by indurating thin transparent films of isinglass between two of these grooved surfaces, covered with lines lying in all directions, we obtain a plate which produces, by transmission, the most extraordinary display of prismatic spectra that has ever been exhibited. [*Brewster's Optics.*

Aldini's Fireman's Defence.

In our own times, the art of defending the hands and face, and indeed the whole body, from the action of heated iron and intense fire,

* See Edinburgh Journal of Science, No. XII. p. 277.

has been turned to the noble purpose of saving human life, and rescuing property from the flames. The revival and improvement of this art we owe to the benevolence and ingenuity of the Chevalier Aldini, of Milan, who has travelled through all Europe to present this valuable gift to his species. Sir H. Davy had shown that a safety lamp for illuminating mines containing inflammable air, might be constructed of wire gauze alone, which prevented the flame within, however large or intense, from setting fire to the inflammable air without. This valuable property, which has been long in practical use, he ascribed to the conducting and radiating power of the wire gauze, which carried off the heat of the flame and deprived it of its power. The Chevalier Aldini conceived the idea of applying the same material in combination with other badly conducting substances, as a protection against fire. The incombustible pieces of dress which he uses for the body, arms, and legs are formed out of strong cloth, which has been steeped in a solution of alum, while those for the head, hands, and feet, are made of cloth of asbestos, or amianthus. The head-dress is a large cap which envelops the whole head down to the neck, having suitable perforations for the eyes, nose, and mouth. The stocking and cap are single, but the gloves are made of double amianthus cloth, to enable the fireman to take into his hand burning or red hot bodies. The piece of ancient asbestos cloth preserved in the Vatican was formed, we believe, by mixing the asbestos with other fibrous substances; but M. Aldini has executed a piece of nearly the same size, nine feet five inches long, and five feet three inches wide, which is much stronger than the ancient piece, and possesses superior qualities, in consequence of having been woven without the introduction of any foreign substances. In this manufacture the fibres are prevented from breaking by the action of steam, the cloth is made loose in its fabric, and the threads are about the fiftieth of an inch in diameter.

The metallic dress which is superadded to these means of defence, consists of five principal pieces, viz. a *casque*, or cap, with a mask large enough to leave a proper space between it and the asbestos cap; a cuirass with its brassets; a piece of armour for the trunk and thighs; a pair of boots of double wire gauze; and an oval shield five feet long by two and a half wide, made by stretching the wire gauze over a slender frame of iron. All these pieces are made of iron wire gauze, having the intervals between its threads the twenty-fifth part of an inch.

In order to prove the efficacy of this apparatus, and inspire the firemen with confidence in its protection, he showed them that a finger first enveloped in asbestos, and then in a double case of wire gauze, might be held a long time in the flame of a spirit lamp or candle before the heat became inconvenient. A fireman having his hand within a double asbestos glove, and its palm protected by a piece of asbestos cloth, seized with impunity a large piece of red hot iron, carried it deliberately to the distance of 150 feet, inflamed straw with it, and brought it back again to the furnace. On another occasion, the firemen handled blazing wood and burning substances, and walked during five minutes upon an iron grating placed over flaming faggots.

In order to show how the head, eyes, and lungs are protected, the fireman put on the asbestos and wire gauze cap, and the cuirass, and held the shield before his breast. A fire of shavings was then lighted, and kept burning in a large raised chaffing-dish, and the fireman plunged his head into the middle of the flames, with his face to the fuel, and in that position went several times round the chaffing-dish, for a period longer than a minute. In a subsequent trial at Paris, a fireman placed his head in the middle of a large brazier filled with flaming hay and wood, as in the annexed figure, and resisted the action of the fire during five or six, and even ten, minutes.

In the experiments which were made at Paris in presence of a committee of the Academy of Sciences, two parallel rows of straw and brushwood, supported by iron wires, were formed at the distance of three feet from each other, and extended thirty feet in length. When this combustible mass was set on fire, it was necessary to stand at the distance of eight or ten yards to avoid the heat. The flames from both the rows seemed to fill up the whole space between them, and rose to the height of nine or ten feet. At this moment, six firemen, clothed in incombustible dresses, and marching at a slow pace behind each other, repeatedly passed through the whole length between the two rows of flame, which were constantly fed with additional combustibles. One of the firemen carried on his back a child eight years old in a wicker basket, covered with metallic gauze, and the child had no other dress than a cap made of amianthine cloth.

In February, 1829, a still more striking experiment was made in the yard of the barracks of St. Gervais. Two towers were erected two stories high, and were surrouded with heaps of inflammable materials, consisting of faggots and straw. The firemen braved the danger with impunity. In opposition to the advice of M. Aldini, one of them, with the basket and child rushed into a narrow place, where

the flames were raging eight yards high. The violence of the fire was so great that he could not be seen, while a thick black smoke spread around, throwing out a heat which was unsupportable by the spectators. The fireman remained so long invisible that serious doubts were entertained of his safety. He at length, however, issued from the fiery gulf uninjured, and proud of having succeeded in braving so great a danger.

It is a remarkable result of these experiments, that the firemen are able to breath without difficulty in the middle of the flames. This effect is owing not only to the heat being intercepted by the wire gauze as it passes to the lungs, in consequence of which its temperature becomes supportable, but also to the singular power which the body possesses of resisting great heats, and of breathing air of high temperatures. [*Brewster's Natural Magic.*

Meteorological Observations for June, 1833.

Days	Moon.	Therm. Sun rise.	Therm. 2 P. M.	Barometer. Sun rise.	Barometer. 2 P. M.	Dew point	Wind. Direction.	Wind. Force.	Water fallen in rain.	State of the weather, and Remarks.
				Inches	Inches				Inches.	
1	☉	58°	77°	29.95	30.00	61°	W.	Moderate.		Flying clouds—clear.
2		62	84	.90	29.80	68	S.	Brisk.	0.65	Rain—flying clouds.
3		62	80	.70	29.70	57	S.	do.		Cloudy—flying clouds.
4		46	71	30.00	30.05	39	N W.	Moderate.		Clear day.
5		50	74	.10	.05	38	N W.	do.		Clear day.
6		60	62	.00	29.83	64	W. SE.	do.		Cloudy—rain.
7		58	62	29.70	.70	60	W. SE.	do.	2.02	Rain—drizzle.
8		60	64	.70	.70	60	W.	do.		Drizzle—cloudy.
9		57	71	.60	.60	45	W.	Brisk.		Cloudy—clear.
10	☽	47	70	.60	.60	45	W.	Moderate.		Clear day.
11		45	68	.55	.60	45	W.	do.		Clear day.
12		50	71	.85	.80	45	W.	do.		Clear day.
13		60	74	.85	.80	68	W.	do.		Flying clouds: clear: thunder
14		60	72	.80	.70	58	W.	Brisk.	0.26	Flying clouds—do. [shower.
15		62	80	.70	.70	36	W.	do.		Clear—flying clouds.
16		64	78	.64	.64	48	W.	do.		Clear day.
17		58	76	.65	.70	46	W.	do.		Lightly cloudy—clear.
18	⊗	56	75	.90	30.00	47	W.	do.		Light clouds—clear.
19		52	70	30.04	.04	57	SE. S.	Moderate.		Fog—cloudy—rain.
20		54	64	29.90	29.90	64	SE. SW.	Brisk.		Cloudy—rain.
21		66	68	.90	.90	64	W.	Moderate.	3.98	Rainy day.
22		64	64	.85	.85	65	W. SE.	do.		Clear day.
23		64	63	.85	.85	56	SE.	do.		Clear day.
24		56	68	.70	.80	63	NW.	do.	0.95	Lightly cloudy—rain.
25		56	65	.55	.55	46	W.	Brisk.		Clear day.
26		56	65	.60	.60	54	NW.	Moderate.	0.20	Rain—flying clouds.
27		55	74	.75	.85	47	SE.	do.		Clear day.
28		64	72	.95	.95	49	NW.	do.		Fog—cloudy.
29		64	76	30.00	30.00	52	W.	do.		Fog—cloudy.
30		58	79	.05	.05	59	NW.	do.		Clear day.
Mean		58.10	73.33	29.80	29.80	54.3			7.46	Clear day.

	Thermometer.	Barometer.
Maximum height during the month,	84. on 2nd, 13th, 22nd.	30.10 on 5th.
Minimum do.	40. on 4th.	29.55 on 11th and 25th.
Mean do.	65.71	29.80